FOOD MANUFACTURE

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

Safe Milk

THE implications of the heat treatment of milk arising from the change in official procedure in licensing not only the "holder" type of pasteurising plant but the HT-ST process were discussed in Glasgow recently at the inaugural meeting of the Scottish Section of the Society of Dairy Technology. Dr. Norman C. Wright, Director of the Hannah Dairy Research Institute, Ayr, presided, and was supported by Dr. A. T. R. Mattick, head of the bacteriological department of the National Institute for Research in Dairying at Reading, Professor D. M. Smillie, Auchincruive, and Mr. D. M'Bride, manager of the milk department of the Scottish C.W.S.

It was agreed to form a Scottish section of the Society and to appoint an interim committee comprising Mr. C. H. Chalmers, Department of Health, Edinburgh; Mr. M'Bride, S.C.W.S.; Mr. J. K. Murdoch, Marketing Officer of the Scottish Milk Marketing Board; Sir Alexander Macgregor, Glasgow; Mr. George Ross, Glasgow; Professor Smillie; Mr. W. D. Smith, representing manufacturers; and a representative of the sanitary inspectors of Scotland; with Mr. T. W. Gibson, Milk Marketing Board, as interim secretary.

Dr. Mattick, in a paper on heat treatment of milk and milk products, said that for some years there had been a movement to supplement the "holder" process of pasteurisation (temperature 145° to 150° F. for not less than 30 minutes) by methods less time-consuming. He asked for attention to the all-important matter of selection of time-temperature combinations that were to be accepted in practice. In his opinion there are sound reasons for excluding from official sanction processes which employ very short times. Public health authorities had to attend not only to tubercle bacillus but a number of other pathogenic organisms. Therefore he held that it was still necessary to pasteurise T.T. milk.

Consideration of the temperature of heating milk, assuming the time of holding to be fixed at 15 seconds, introduced the important matter of the cream-line. Every dairyman knew the value of the cream-line, and the housewife in normal times obstinately demanded it. There was evidence that

when milk was heated at a temperature and/or for a time longer than was necessary to kill pathogens and to confer good-keeping quality, the cream failed to rise in proportion to the extent of overheating. Above 160° F. there was a rapid increase in loss of cream-line.

Mr. Chalmers, Department of Health, said that Scotland already had thirty-six authorised HT-ST plants, operating with a capacity of about 120,000 gallons per four hours, which is equal to from one-third to one-half of the total liquid milk consumed in Scotland. Mr. George Ross, Glasgow, said that the outstanding fact to-day was that, with pasteurised milk the common practice, public demand had outstripped production. From that fact, he suggested that producers should concentrate upon the production of more milk to satisfy demand and should leave the treatment of milk to the distribution trade.

A Milk Distributors' Board

The difficulties of bringing both milk manufacture and milk distribution within the scope of a single marketing scheme have proved to be beyond the powers of the Central Milk Distributive Committee; consequently the new scheme drafted by that organisation, as a result of twelve months' work, deals only with milk distribution. The original intention to scrap the Milk Products Marketing Scheme, which is now in abeyance, has been abandoned. Nevertheless the Products Scheme, designed to regulate the marketing of cream, condensed milk, milk powder, butter, and cheese, will be greatly affected by the machinery which the Central Milk Distributive Committee proposes should be established.

The new distributive scheme embraces wholesale and retail distribution, and applies to co-operative societies, producer-retailers, private dairymen, milk depôts, and producers of sterilised milk. No firm may distribute milk unless registered with the Distributors' Board or declared to be exempt from the scheme. Exemption is granted to wholesale milk producers; marketing boards in respect of milk delivered direct from farms to distributors or manufacturers; shops (other than dairies) that do not sell more than an average of 8 gallons a day; establishments that sell milk only for consumption on the premises; and local authorities in respect of sales of milk in connection with maternity and child welfare.

The Milk Distributors' Board will consist of twenty-five or twenty-six persons, but the personnel of the original Board are not named in the draft; nor are the boundaries of the ten divisions into which it is proposed to divide England and Wales for purposes of the scheme. It is provided, however, that the Board shall consist of representatives of both private and co-operative retailers, wholesalers and depôts, and a representative of the producers of sterilised milk. The Board will have power to determine the descriptions of milk that may be sold by a registered distributor, the prices at which and the persons to whom it may be sold, and the manner in which it may be graded and marked.

No provision is contained in the draft for contributions by registered distributors to meet the Board's expenses, as it is contemplated that these will be met by a central fund of the Milk Industry Council. This fund would be created by the difference between the price at which milk is acquired from the producers and the prices at which it is sold to manufacturers and distributors. The suggested Milk Industry Council would be an overriding central authority to which many of the powers of the Ministry of Food in regard to milk and milk products would be transferred. The existence of such a Council would necessitate revision of the Milk Products Marketing Scheme. That scheme, moreover, applies to the United Kingdom, whereas the Milk Marketing Scheme and the produced Milk Distribution Scheme apply only to England and Wales. Legislation will be necessary before the new scheme can come into operation, but as it has been prepared on the invitation of the Minister of Food it would seem that, if satisfied, he would be prepared to introduce enabling legislature.

Ice Cream Plans

Inaugural meetings of the South Wales and Yorkshire Divisions of the Ice Cream Alliance, Ltd., were held recently, both meetings being presided over by Mr. A. Facchino.

All the speakers stressed the necessity for building up the Alliance to such a strength that no legislative action affecting the industry could be undertaken by the Government in post-war years without prior consultation with the trade organisation.

The chairman commented on the differences between public appreciation of ice cream as a food in this country and the U.S.A. In the city of New York alone, which is smaller than London, there is more ice cream consumed than in the whole of Britain. The industry needed a first-class organisation to develop its possibilities. Mr. Facchino predicted that, at the cessation of hostilities, a great deal of legislation concerning the ice cream industry would be effected. To take one example alone, the Food and Drugs Act is in suspense as far as ice cream is concerned because it is not possible to allocate the right ingredients to the trade even if the manufacture of ice cream were permitted. This Act, however, empowers the Ministry of Health to take steps to set up standards and to define ice cream. Unless the trade is strong and unanimous in its decisions, the Ministry may make arbitrary rulings which would result in unnecessary hardships being imposed on the industry.

The point was raised as to whether the present

marketing of an inferior article would prejudice people against genuine ice cream when it again became available. This possibility was ridiculed on the grounds that practically every commodity now on the market was comparatively inferior, but that fact would not prejudice the demand for such commodities when in due course they became of better quality. On the contrary, people would look forward the more to the time when they would be able to obtain goods of approximately pre-war quality.

How Hungry is Starving Europe?

Is it not time that the air was cleared over the Continent? The veil of silence due to the occupation has been rent asunder and the smoke of battle has passed to enemy territory. Such information as has so far drifted across indicates that in France, Belgium, and Holland there is more food than in England. We do not think that the ice cream barrow recently pictured in the popular Press can have been resurrected and replenished only for the entry of British troops, shown regaling themselves at it. The retreat has been so rapid that the enemy could not have driven before him any of the livestock nor carried away more than a fraction of this year's harvest. Very little of the agricultural land has been fought over and the crops thus destroyed. We learn from an overseas source that London produce men expect that, on the cease fire, they will have from Denmark ample dairy produce in *thirty days*.

What then of the bursting Canadian granaries, filled by farmers who were urged to stupendous efforts to feed starving Europe? Surely this great store will find its way, at any rate in part, to this country?

If these premises are correct, it is just as well that we face up to the actual position and cease to delude ourselves with the belief that "after the peace" there will be years of Government buying and a guaranteed market for raw and manufactured foodstuffs produced in Britain.

Determination of Vitamin A Content of Margarine

A spectrophotometric method for the determination of vitamin A in margarine (described by R. H. Neal and F. H. Luckmann, *Industrial and Engineering Chemistry*, Analytical Edition, June, 1944) is based on the destruction of vitamin A in a portion of a solution of the unsaponifiable fraction of margarine fat by ultra-violet irradiation, and the use of this devitaminised solution as a control for the spectrophotometric determination of vitamin A in a second portion of the original unsaponifiable solution not irradiated with ultra-violet light. This method gives consistent and reproducible results, and practically complete recovery of the vitamin A contained in margarine. Two satisfactory solvents and two satisfactory instruments for this determination are described. The validity of the method has been demonstrated by comparison with the U.S.P. biological method on identical samples, by feeding both the sample under test and the U.S.P. standard of reference oil at multiple levels and estimating the biological vitamin A potency from log-dose interpolation curves.

Social Security

Food manufacturers will receive exactly the same treatment as other industries under the Government schemes for social insurance (Cmd. 6550) and workmen's compensation (Cmd. 6551). Both schemes will be administered by a new Ministry of Social Security. Under the first of these schemes everybody, from the head of the firm down to the office boy, must insure. The rates of contributions falling on firms will be higher than under the existing national health and unemployment insurance schemes (which the new project will supersede), but the benefits to be conferred on employees will also be higher. The weekly scale of contributions will be:

	Employee's Payment.	*Employer's Payment.*	*Total.*
Men:	*s. d.*	*s. d.*	*s. d.*
Aged 18 and over	3 10	3 1	6 11
Aged 16 to 18 ..	2 5	2 1	4 6
Women:			
Aged 18 and over	3 0	2 5	5 5
Aged 16 to 18 ..	2 0	1 7	3 7

The principal benefits include: sickness and unemployment benefits of 40s. a week for married couples and 24s. a week for a single man or woman; retirement pensions of 35s. for a married couple or 20s. for a single person, the qualifying age being 65 for a man and 60 for a woman; invalidity benefit, after three years of continuous sickness, at the same rates as for retirement pensions; maternity grants and benefits; training allowances; orphans' allowances; family allowances; widows' benefits of 36s. a week for 13 weeks; widows' pensions (above 50 years of age) of 20s. a week; and death grants.

Persons working on their own account will pay 4s. 2d. per week in the case of men and 3s. 6d. in the case of women; but such people will not be entitled to draw sickness benefit during the first four weeks of an illness or to draw unemployment benefit. Retirement at pensionable age will not be compulsory. In fact, a man or woman who remains at work instead of retiring will have the ultimate pension increased by 1s. a week for every year worked beyond the retiring age. In the case of a married man the increase will be 2s. per week per annum. Where husband and wife are both employed they may each qualify for a single person's pension on reaching pensionable age. In that case

they would draw 20s. each instead of a combined pension of 35s. in cases where only the husband is a contributor to the scheme. The whole plan follows closely the proposals of Sir William Beveridge, to whom the authors of the White Paper pay a splendid tribute.

The second White Paper accepts the recommendation of Sir William that the existing system of workmen's compensation should be superseded and that provision for industrial disability should be made part of a unified scheme of social insurance of a contributory character. The Government proposes that in future workmen's compensation shall not be an employer's liability. The new scheme will cover, broadly, all persons above school age working under a contract of service or apprenticeship. It will not provide for "contracting out" schemes. It will apply to occupational accidents and to specified industrial diseases. The liability will rest on a central fund under the charge of the Minister. The weekly rates of contribution will be 6d. for a man, 4d. for a woman, and half rates for juveniles. These payments will be shared between the employers and the employees. Disability pensions payable under the scheme will be based on the degree of disability and not on the loss of earnings. Such pensions would not be affected by any future earnings. It will not be permissible to pay a lump sum in lieu of pension. In fatal cases a widow will receive compensation plus an allowance in respect of the first child.

Apparent Vitamin C in Foods

It has been known for some time that 2:6-dichlorophenolindophenol, used to estimate vitamin C in a wide variety of foodstuffs, may react with substances other than this vitamin. F. Wokes, Joan G. Organ, Jeannette Duncan and F. C. Jacoby (*The Biochemical Journal*, 37, 6, 695) have accumulated evidence to show that the apparent vitamin C content of foods can become considerably higher than the true value under manufacturing and storage conditions which may occur in practice. In their summary of their experimental work the authors state that the provisional term "apparent vitamin C" is proposed to be adopted to describe a group of substances occurring in foods and closely resembling ascorbic acid in chemical and physical properties (including their behaviour towards oxidising enzymes), so that they are not distinguished from vitamin C by the dye titration generally employed. The substances are described and all probably contain the dienol group. They differ from ascorbic acid in being produced by the action of heat on certain constituents (*e.g.*, pectins, carbohydrates) in foods and also (except hydroxytetronic acid) in their rate of reaction with formaldehyde under given conditions. These differences in behaviour have formed the basis of estimating apparent vitamin C in foodstuffs.

Apparent vitamin C has been found in germinated grains, male extract, cocoa, chocolate, dehydrated fruits and vegetables, etc., and among those in which particularly high contents have been found are fruit juices and dried foods stored for several years under normal conditions. The apparent vitamin C content of processed and dehydrated foods may gradually increase during storage under normal conditions and thus obscure loss of true vitamin C in storage experiments.

Better Tea

It is excellent news that the L.N.E.R., in association with the Empire Tea Bureau, has issued directions to employees on the making of tea in urns and multipots. The move is to be commended both from the Briton's point of view and from that of future visitors to this country. Though the end of hostilities is not yet, we are discussing in the daily Press the possibilities of a great tourist trade by improving, and vast improvements are certainly needed, our hotel catering. Yet more important are first impressions of foreign visitors when they arrive, travel in comfort (in normal times) on our railways unsurpassed for safety and quietness of rolling stock, and venture into those "refreshment rooms" often, unfortunately, so misnamed. We transport them in safety for hundreds of miles, then, with a peculiar British *laissez faire*, offer them our national beverage badly made. Tea, magic tea, which has sustained a nation with its back to the wall; which has been the first thing asked for in those grim nights of air raids, in those dawns of jaded nerves, or at the end of the evacuees' long journeyings from their homes!

"A strange influence over mood, a strange power of changing the look of things, and changing it for the better, so that we can believe and hope and do under the influence of it what we should otherwise give up in discouragement and despair"—that is the effect of tea on the Briton.

Yet the tea which the foreign visitor will get—or would have got, assuming that the L.N.E.R.'s mission will be fruitfully copied by other companies and thus make everything of the past tense—consists of a brown liquid with the sole merit of temperature, served in vessels cracked and chipped to an unhygienic primitive state. "Threepence a cup" has been explained by the readiness with which we passengers break or lose the cups. But it does not explain why, having paid for our breakages, we should not get tea therein. All these complaints in readers' letters to the Press cannot be ignored. Though there are those ever ready to break a lance or cross a nib in their haste to enter controversy, any railway director in doubt has only to undertake a journey of inquiry to see for himself the crude extract—"water browned off," as Mr. Ivor Brown calls it—which is served, moreover, with such nonchalance and the all-too-familiar take-it-or-leave-it attitude.

Milk and the Consumer

PART II

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The Holder Method

IN THIS country until July, 1941, there was only one definition of pasteurisation—heating milk to 145° F. for 30 minutes and cooling immediately to less than 55° F.[19]. This treatment has an ample margin of safety, and other countries are content with somewhat milder treatments.

High-Temperature Short-Time Pasteurisation

By this method we understand in Britain a process in which milk is heated to at least 162° F. (71·1° C.) for 15 seconds and then immediately cooled to less than 55° F. (13° C.).[20]. It can be carried out by heat exchangers of the plate type, varying in capacity from 50 to 4,000 gallons per hour (Figs. 3 and 4), or by surface heat exchangers. It was first tried experimentally in this country in 1923 and was officially recognised as a statutory process in 1941, but only provisionally as a war-time measure. The process has had a mixed reception. It has been found that some M.O.H. express the hope that it is only a temporary measure, and some dairy operatives have expressed a preference for the holder method as being less "finicky" and easier to control. The method is obviously a precision one and must be carefully controlled. The advantages of the method are so obvious, however, that it will undoubtedly survive that prejudice which invariably opposes the adoption of a new process. The chief advantages are economy of plant and floor space and the fact that pasteurised milk is available for bottling, etc., within a few minutes of receiving the raw milk supply. In the author's opinion HT-ST has come to stay, and may possibly be the only method in general use in a few years' time.

"In-Bottle" Pasteurisation

With the "in-bottle" method, milk at 150° F. or thereabouts is filled into sterilised bottles and the milk held at 145° F. for half an hour in the bottle, which thus acts as a holder. The milk is then cooled by cold-water circulation.[1] It will be evident that in such a method, properly carried out, post-pasteurisation contamination is impossible. "In-bottle" pasteurised milk is the only milk for which an absolute guarantee can be given that it is safe from all pathogenic organisms, although milk properly pasteurised by other methods can be regarded as reasonably safe in practice. Such milk has also excellent keeping qualities, and there can be no doubt that, from all points of view, "in-bottle" pasteurised milk is the best and safest; it is perhaps surprising that it has not had more support from public health officials.

The process has not been generally adopted, however, and it is regarded by many people as idealistic but impracticable. The plant is extensive and requires much floor space.

On the question of choice of method for consumer milk we may therefore regard it as a contest between the HT-ST and the "in-bottle" methods. The ordinary holder method is probably already doomed.

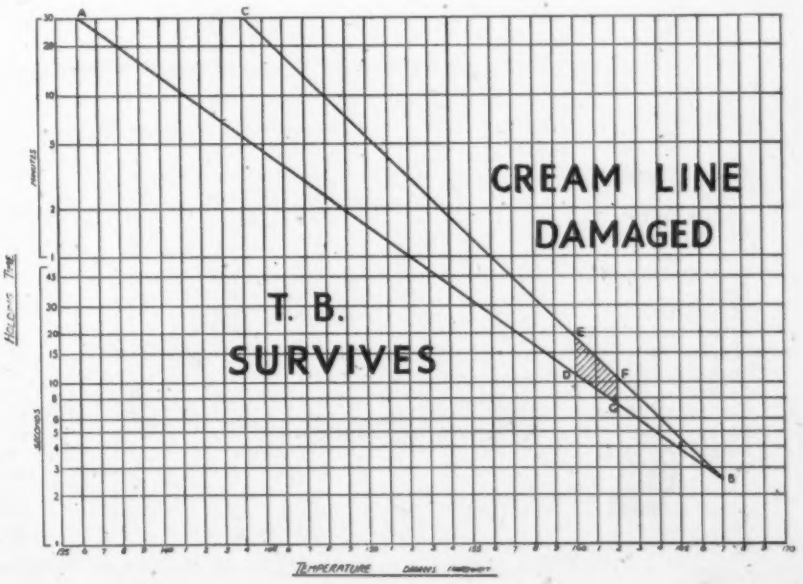

Fig. 1.—At all combinations of time and temperature which fall within the triangle ABC tubercle bacillus is destroyed whereas cream line is unimpaired. At points to the right of BC cream line is damaged. At points to the left of AB tubercle bacillus survives. Note how the margin diminishes as B is approached. The area DEFG marks the combinations of time and temperature generally accepted for the High-Temperature Short-Time Process.
Courtesy of Aluminium Plant and Vessel Co., Ltd.

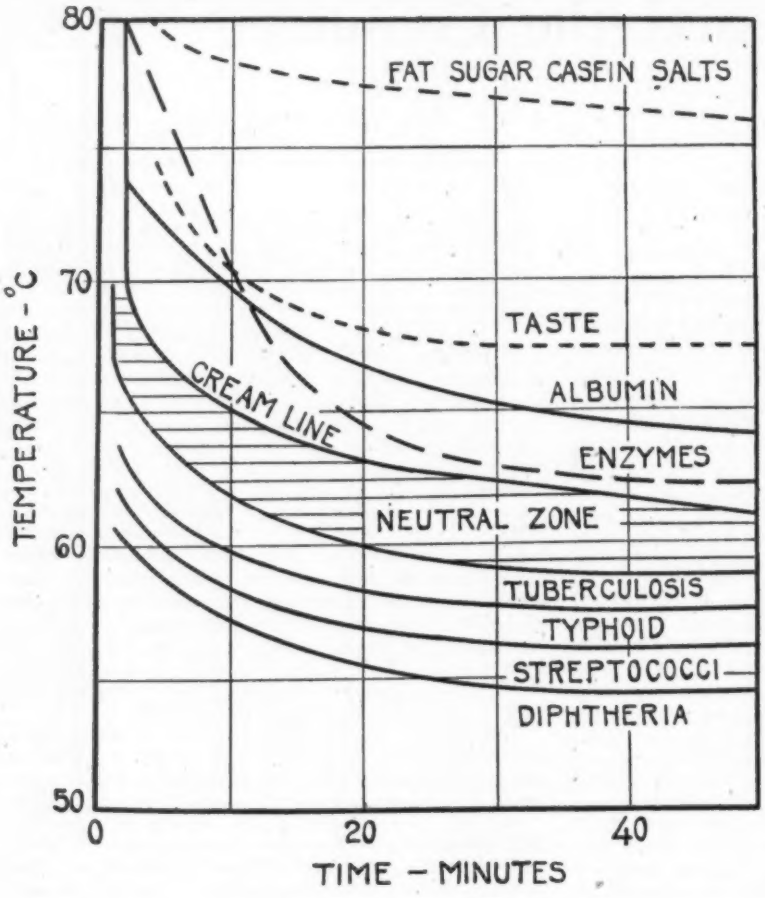

Fig. 2.—Effect of heating on the constituents of milk and on certain pathogenic bacteria. (*From North.*)

TABLE 6

NUTRITIVE VALUE OF COMMON FOODS

(All figures per 100 g. or 100 ml.)

	Calories.	*Protein.* (*g.*)	*Fat.* (*g.*)	*Carbohydrate.* (*g.*)	*Calcium.* (*mg.*)	*Iron.* (*mg.*)	*Phosphorus.* (*mg.*)
Cream cheese	813	3·2	86	tr.	29·6	0·14	44
Bacon	509	12·5	49·3	0	13·5	0·9	94
Stilton cheese	475	25·1	40	tr.	362	0·46	304
Cheddar cheese	423	25·0	33	tr.	810	0·57	545
Roast beef	385	21·3	32·1	0	5·8	4·6	237
Currant bun	208	8·1	7·6	54·5	35·9	2·13	65·0
Honey	288	0·4	tr.	76·4	5·3	0·39	17·0
Liver (fried)	262	29·0	14·5	2·4	8·8	21·7	576
White bread	241	7·9	0·7	53·7	23·1	1·0	73
Herring (fried)	235	21·8	15·1	1·5	38·6	1·9	339
Corned beef	231	22·3	15	0	12·8	9·8	119
Eggs	163	11·9	12·3	0	56	2·53	218
Cob nuts (whole)	143	3·2	13	2·4	16	0·38	82
Beans (baked)	93	6·0	0·4	17·3	61·6	2·05	184
Potato (old raw)	87	2·1	tr.	20·8	7·7	0·75	40·3
Whole milk	66	3·3	3·7	4·8	120	0·08	95
Ale (pale draught)	55	0·3	tr.	3·2	10·9	0·05	21·5
Apple (whole)	36	0·2	tr.	9·3	2·8	0·23	6·7
Orange (whole)	27	0·6	tr.	6·4	31	0·25	17·8

Data from *Chemical Composition of Foods*, McCance and Widdowson, 1942.

It will be a question of deciding between the idealistic but expensive and inconvenient "in-bottle" process and the rapid, compact, but less "fool-proof" HT-ST method.

Objections to Pasteurisation

All objections to pasteurisation fall into one of two classes—(1) those based on the assertion that the milk is damaged in one way or another, and (2) those of an economic or political nature.

Objections in the first group may be further classified into nutrition, immunity and palatibility aspects. The more important of these objections are briefly reviewed below.

(a) *Pasteurisation significantly lowers the nutritive value of milk.* Of all the recognised constituents of milk it is now generally admitted that only two are appreciably affected by heat, vitamins B_1 and C, and these suffer destruction to the extent of 10 to 20 per cent. Milk is not particularly rich in either of these vitamins; of our daily requirements 1 pint of milk supplies only 15 to 30 per cent. of B_1 and 20 per cent. of C. In effect, we rely on other foods, especially vegetables and fruit, for these vitamins. Moreover, it is not pasteurisation as such which destroys vitamin C, but previous or simultaneous exposure to light, especially in the presence of copper. Keeping the milk in the dark and removal of oxygen by deaeration minimises this loss on pasteurisation. The desirability of slightly carbonating milk (adding carbon dioxide) after pasteurisation and before bottling might be considered. Such a carbonation would improve the flavour, diminish loss of vitamin C and possibly improve keeping quality. We should remember that the vitamin C content, although small, is distinctly useful; in the U.S.A. the cows produce roughly the same amount of vitamin C as the citrus fruit trees. Many experiments have been made to compare the nutritional effect of raw and pasteurised milk, but no completely satisfactory experiment has ever been made with children. Very carefully controlled experiments by Kon and Henry at Shinfield, using rats, failed to show any significant differences between raw and pasteurised milk.[21] Other workers have also failed to obtain significant differences when using mice, rats, calves and children.[22, 23, 24] The experiments with calves were particularly interesting, as a proportion of the calves fed on raw milk contracted tuberculosis, but none of the calves fed on pasteurised milk did so.[23]

Other objections are less important. They include the following claims:

(b) *Consumption of pasteurised milk is more likely to lead to decay in teeth than if raw milk is consumed.*

(c) *Pasteurisation fails to destroy bacterial toxins in milk.*

(d) *Pasteurisation affects the disease-resisting property of milk.*

(e) *Universal pasteurisation would lead to the elimination of tuberculosis of the bovine type and so result in an increase in tuberculosis of the human type.*

(f) *Pasteurisation would discourage the eradication of disease in dairy cattle.*

(g) *Pasteurisation would remove the incentive for producers to deliver clean milk.*

(h) *Pasteurisation affects the palatability of milk.*

(i) *Pasteurisation is often inefficient.*

(j) *Pasteurisation enables the distributor to sell stale milk to the public and so eliminates the necessity for the dairymen to get milk from the farm to the consumer as quickly as possible.*

(k) *It is wrong to interfere in any way with Nature's perfect food.*

With the exception of the last three, it may be said that all these are either wrong or that there is no conclusive evidence on the subject. All interested persons are strongly recommended to read the excellent discussion of the subject in Professor Wilson's book *The Pasteurisation of Milk.*[11] The ante-penultimate objection was formerly only too true, and much still remains to be done in the control of commercial pasteurisation. This is, in the author's opinion, the only valid objection, and it is rapidly ceasing to be an objection. The last objection cannot, of course, be

TABLE 7

PRICE TO CONSUMER IN PENCE PER UNIT OF FOOD CONSTITUENT (1939)

	Av. price per 100 *g.*	*Protein.* (100 *g.*)	*Fat.* (100 *g.*)	*Carbohydrate.* (100 *g.*)	*Calories.* (1,000)	*Calcium.* (1 *g.*)	*Phosphorus.* (1 *g.*)	*Iron.* (10 *mg.*)	*Potassium.* (1 *g.*)
Flour	0·44	4·1*	490	0·55*	1·25*	24	4·3*	4·8*	3·06*
Bread (white)	0·44	5·5*	—	0·75*	1·75*	19	6*	4·4	3·8*
Potato	0·22	10·5	—	1*	2·5*	30	5·5*	3*	0·4*
Beef	2·43	11·4	7·6*	—	6·3	420	10·2	5·3*	8·4
Milk	0·6	18	16	12·5	9	5*	6·3*	75	4*
Cheese (Cheddar)	2·3	9·2*	7*	—	5·5	3*	4·2*	40	20
Cheese (cream)	10·6	214	12·3	—	9·8	360	246	760	226
Butter	3·5	875	4·1*	—	4·4	—	146	220	234
Bacon	3·3	26·5	6·8*	—	6·5	244	35	37	12·3
Herring (raw)	1·3	7·9*	7·3*	—	4·8	13·1	4·9*	9	4·2*
Egg	2·9	24·5	23·5	—	18	52	13·3	11	21
Sugar	0·66	—	—	0·66*	1·67*	—	—	—	—
Honey	4·0	995	—	5·2	13·8	750	234	102	78
Apple	1·32	660	—	14·2	36·7	472	197	58	13·9
Orange	1·32	220	—	20·6	49	42·6	74	53	8·9
Beer	0·88	293	—	27·5	16	80·8	41	176	15·7
Margarine	1·45	724	1·7*	—	1·8*	353	121	48	290
Calcium carbonate	—	—	—	—	—	0·03	—	—	—
Iron chloride ($FeCl_3$)	—	—	—	—	—	—	—	0·0005	—
Potassium phosphate (K_2HPO_4)	—	—	—	—	—	—	0·7	—	0·3

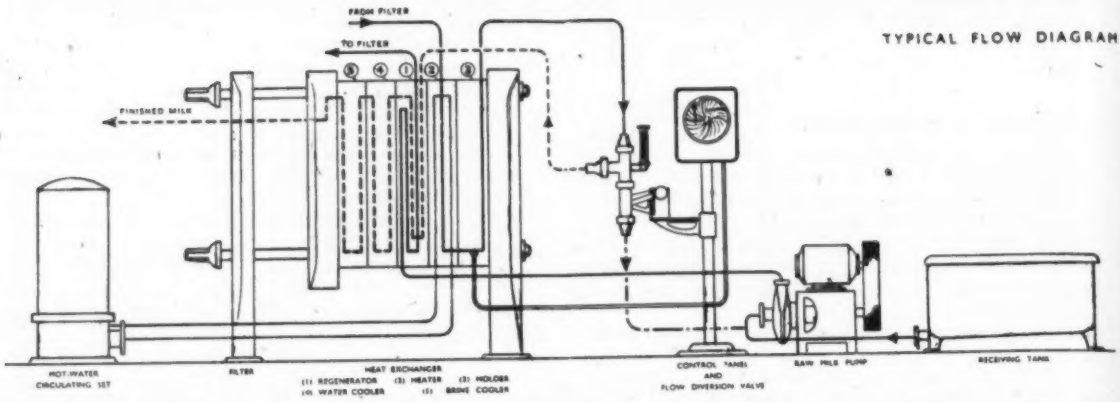

Fig. 3.—The milk is pumped from the tip tank by the centrifugal pump into he regenerative section of the Heat Exchanger marked (1), where it is pre-heated for efficient filtration and then returns for final heating in section (2) of the machine. At the carefully controlled temperature of 162° F. it enters the holder (3) at the inlet of which is located, the bulb of the combined temperature recorder and Flow Diversion Valve, together with a visual check thermometer.

After holding, the milk passes to the Flow Diversion Valve and then back to the regenerator (1), water section (4) and brine section (5) for cooling.

The pipe line through which it flows is arranged at such a height that should the Flow Diversion Valve be automatically called into operation all the milk must pass downwards into the suction side of the raw milk pump, and none can pass forward.

The whole mechanism remains in this condition until the necessary measures have been taken to correct the fault and until the temperature regains the figure of 162° F. when the operator is able to lift the weight, re-set the pin by hand and the milk passes again to the cooler.

It is known that such a temperature system has a certain time lag which has in fact been very carefully measured and tested in our works.

It is of the order of 2-5 seconds according to conditions, so that, as the holding time through the holder is 15 seconds, there is a factor of safety of at least 3 : 1 to ensure that no under-heated milk can possibly pass through to the cooler. Similarly an automatic arrangement is provided which positively prevents the operator re-setting the diversion valve until the temperatur, has been re-established for at least 20 seconds, thus making quite certain again that no under-heated milk can pass forward.

The thermograph gives the normal record of time-temperature treatment.

Courtesy of Aluminium Plant and Vessel Co., Ltd.

controverted. A person's belief is not susceptible to reasoned argument. We can only point out that we bake bread, roast meat, fry fish, poach eggs, boil or steam vegetables and stew fruits. All these processes involve far more drastic heat treatment than the very mild heating involved in pasteurisation. Why should any reasoning person object to the pasteurisation of milk?

The Utilisation of Milk in the Household

Before coming to a final conclusion on this controversial question let us consider what happens to the milk when it reaches the household, which after all is the most important aspect. Milk may be used for cooking, for making coffee, cocoa or any one of the health drinks, for making tea, with breakfast cereals or fruit, or it may be drunk raw or as it comes from the retailer. It will be evident, therefore, that a large proportion of the milk will in any case be raised to boiling point. According to Murray and Rutherford, about 19 per cent. of milk is drunk raw, 7 per cent. with cereals, etc., 11 per cent. for milk drinks, 27 per cent. for cooking and 36 per cent. for tea, coffee and cocoa.[7] In other words, about 60 per cent. of the milk is boiled and only about 27 per cent. consumed raw, assuming that about half of the cereal and milk drinks utilise raw milk. Even the most obdurate opponents of pasteurisation must admit that boiling does much more harm to milk than pasteurisation. The logical course, then, for opponents of pasteurisation would be to launch a campaign to stop the cooking or boiling of milk in the home and to insist that all or most of it is drunk raw. If we assume that boiling effects three times as much damage to vitamins B_1 and C as pasteurisation, it is evident that pasteurisation of all milk would have no worse effect than the boiling of one-third of it. Apart from the destruction of vitamins, etc., boiling milk in the saucepan can result in a mechanical loss of 10 to 15 per cent., due to the precipitation of protein, fat and lime salts on the saucepan. Milk should, therefore, never be boiled unless necessary; heating to 160° F. (70° C.) will not only make it warm enough for a hot drink, but will kill all disease germs and avoid heavy losses in nourishment.

A Cup of Tea

Finally, let us consider one of the commonest things we do with milk—the making of a cup of tea. The upholders of raw milk doubtless regard pasteurisation as a most destructive treatment for milk, and some have referred to pasteurised milk as "pernicious poison." Possibly they have never thought about what happens to milk when they put it in tea. Actually they are pasteurising the milk. A typical cup of tea made under the conditions beloved by the British housewife is served at a temperature of about 150° F.; tea served at any lower temperature would doubtless be regarded as cold, since most of us like to sip our tea at about 145° F.[35] The reduction of bacteria in milk as the result of making a cup of tea is about the same as that obtained by pasteurising it. The temperature-time data obtained by experiment shows that the heat treatment is approximately the same as in pasteurisation. Logically, therefore, opponents of pasteurisation should insist that no milk is used for cooking in

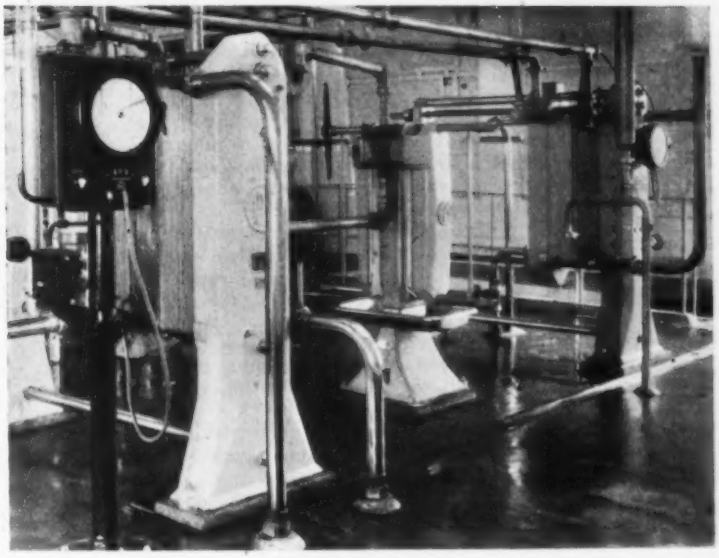

Fig. 4.—Modern HT-ST plant showing temperature control and flow diversion valve (left), regenerating and heating sections (left centre), filter (centre), and water and brine cooling sections (right).

Courtesy of M.M.B. Creamery, Camborne, Cornwall, and Aluminium Plant and Vessel Co., Ltd.

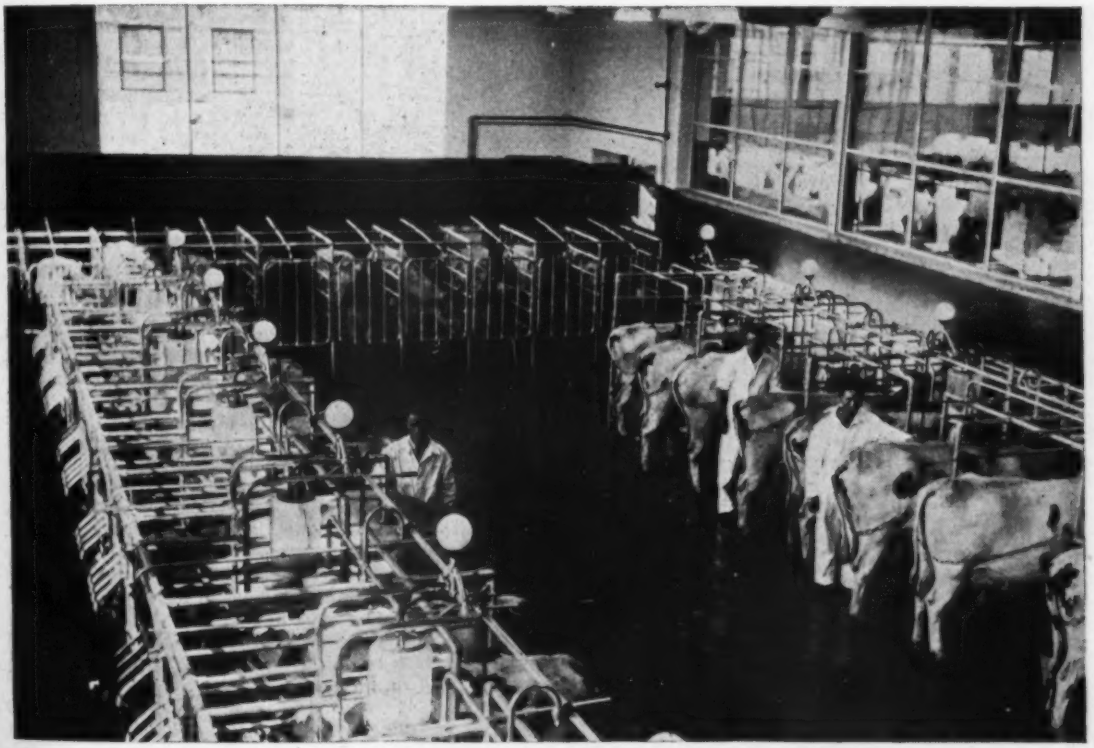

Fig. 5.—Ideal lay-out for milking-house or factory.

Courtesy of Dr. Chalmers-Watson and Messrs. Geo. H. Gascoigne Co., Ltd.

any way, and that all hot milk drinks are served so mildly warm that probably no one would enjoy drinking them.

The position may be summarised as follows:

(1) There is no proof that milk contains in large amounts a heat labile vitamin or other essential constituent that is present in only small amounts in other foods. While it would be foolish to deny the possibility of the existence of such a substance, all the evidence is strongly against the supposition.

(2) Much of the milk consumed is boiled or heated far more drastically than is required for pasteurisation. Even making a cup of tea does about as much damage to milk as pasteurisation. Only a fraction of the total is consumed raw.

(3) The most valuable constituents of milk—namely, the minerals, especially calcium and potassium, the protein, the vitamins A, B_2 and D, and the fat—are all known to be unaffected by pasteurisation. A small proportion of B_1 and C is destroyed in pasteurising, but most of our B_1 and C is obtained from vegetables and fruit.

(4) In practice it is impossible to ensure a safe supply of raw milk for the whole community. Pasteurisation is the simplest and cheapest method of treating milk to make it safe. It is apparent, therefore, that the objections to pasteurisation raised by so many well-meaning people are, from a common-sense point of view, just nonsense, and the "pasteurisation bogy" may well be described as one of the greatest

TABLE 8

A Simple Method for Assessing the Adequacy of a Diet

Score 20 points for each dietary constituent in order to ensure a complete diet for 1 day.

Typical Diet.	*Vitamins.*				*Iron.*	*Calcium.*
	A.	B_1.	B_2.	*C.*		
3 slices white bread ..	0	1	0	0	1	1
3 slices wholemeal bread	0	3	1	0	3	1
Cereal (breakfast) ..	0	2	0	0	2	0
Beef (roast)	0	2	2	0	5	0
Bacon	0	0	0	0	1	0
Potato	0	1	0	5	2	0
Peas (fresh or tinned)..	3	3	1	1	3	0
Vegetable soup ..	1	0	0	1	2	1
Cake	0	0	0	0	1	1
Butter, 2 pats	3	0	0	0	0	0
Sugar	0	0	0	0	0	0
Jam	0	0	0	0	0	0
Rice	0	0	0	0	0	0
1 egg	3	1	1	0	3	1
1 glass beer	0	0	2	0	0	0
1ST TOTAL ..	11*	14	8*	7*	25	7*
2 cups milk	4	2	8	1	0	10
1 oz. Cheddar cheese ..	2	0	2	0	2	7
2ND TOTAL ..	17	16	18	8*	27	24
1 orange	1	1	0	14	1	1
3RD TOTAL ..	18	17	18	22	28	25

One average helping is assumed unless otherwise specified. These values can obviously only be approximate.

* = Marked deficiency.

TABLE 9

Consumption of Milk in Various Countries[10]

Country.	(1930-34). *Pints per Day*
Switzerland	1·27
U.S.A.	0·86
Denmark	0·79
Netherlands	0·66
New Zealand	0·61
Great Britain* (1930-31)	0·50
France	0·50
Germany	0·50
Australia	0·49

* This figure is probably high. Other estimates are approximately 0·4 pint per day. Different methods of estimating the consumption naturally give slightly different results. (*Cf.* Table 10.)

TABLE 10

Increase in Consumption of Milk in England and Wales

(*After Davies.*[2])

Year.	*Pints per Head per Day.*	*Increase (Per Cent.).*
1933-34	0·37	0
1935-37	0·38	3
1937-39	0·45	16
1942-43	0·58	57
May, 1943	0·65	76

"bally-hoos" of the time. The public should, therefore, not oppose pasteurisation, but demand that it be done properly.

(5) The only valid objection to compulsory universal pasteurisation is the problem of the producer-retailer. Here the objection is not so much to pasteurisation as such, but to the economic threat of the combine or big firm to the individual. However, there is no reason why with sympathetic handling the problem could not be solved. It might be suggested that producers of non-T.T. milk should either send their milk to a municipal depot for pasteurising, the cost being met by a Government subsidy if necessary, or else exchange it at a creamery for pasteurised milk. Producers of T.T. milk should be permitted to sell raw milk provided that a high standard of cleanliness is maintained.

Long-Term Policy

One further aspect is of interest. Many intelligent persons raise the following question: We agree that under present conditions pasteurisation is a necessity, but will it be possible one day to deliver safe raw milk to the public as a whole?

It is, of course, theoretically possible, but before we can consider this prospect we shall have to insist on the following minimum conditions:

(1) Regular medical inspection of all personnel handling milk in the farm, in the creamery and in the distributing depot.

(2) Regular veterinary inspection of all cows and specific examinations for T.B., *Brucella abortus* and streptococci.

(3) Control of cow sales—*i.e.*, preventing the sale of diseased animals.

TABLE 11

EXPENDITURE ON MILK, ETC., PER HEAD PER WEEK

(After Crawford.[8])

	Social Class.				
	D.	*C.*	*B.*	*A.*	*AA.*
Fresh milk (d.)	5·7	9·1	15·3	17·4	18·6
Fresh milk (pints)	1·57	2·62	4·38	5·02	5·3
Cream (d.)	0·1	0·22	1·1	2·8	4·2
Cream (equiv. pints)	0·02	0·07	0·38	0·93	1·44
Condensed milk (d.)	1·5	1·02	0·3	0·2	—
Condensed milk (equiv. pints)	0·57	0·32	0·11	0·05	—
Butter (d.)	3·6	6·0	9·1	10·2	10·9
Butter (ozs.)	4·5	7·2	10·3	11·3	11·6
Margarine (d.)	1·4	0·9	0·6	0·7	0·9
Margarine (ozs.)	3·7	2·4	1·4	1·5	1·8
Cheese (d.)	1·2	1·6	2·2	2·7	2·8
Cheese (ozs.)	2·1	2·7	3·0	3·3	3·3
Estimated weekly income	12s. 6d.	20s. 3d.	43s.	88s. 4d.	159s. 6d.
Estimated weekly expenditure on food	5s. 10d.	7s. 11d.	12s. 6d.	16s. 2d.	18s. 9d.
Food expenditure as per cent. of income	46·6	39·2	29·0	18·3	11·8

(4) Compulsory cleaning and sterilising of all utensils and equipment coming into contact with milk.

(5) Compulsory cooling of milk to 45° F. or lower within 2 hours of production.

(6) A system of distribution which ensures that the milk is cooled to 40° F. at the depot, and that the temperature never rises above 50° F. in the course of distribution.

(7) Universal refrigeration in the home.

Assuming that all these conditions are fulfilled, a supply of sweet (non-souring) milk could be guaranteed to the consumer and regarded as *reasonably* safe. No *absolute* guarantee of safety (in the disease sense) could be given with any system of milk distribution other than efficient "in-bottle" pasteurisation.

Milk Legislation Trends in Britain

Two important White Papers have recently been issued—"Memorandum on Milk Policy," 1942 (Cmd. 6362) and "Measures to Improve the Quality of the Nation's Milk Supply," 1943 (Cmd. 6454). The more important items in the latter may be summarised as follows:

England and Wales

1. Every herd should be inspected at least once a year. At present only Attested herds and those producing Accredited and T.T. milk are necessarily tested. T.T. herds will be inspected every six months, as at present, and Accredited herds will be inspected once a year if the milk is heat treated; otherwise every three months. Attested herds will be inspected every six months. All other herds will be inspected once a year where the milk is heat treated; otherwise twice a year.

2. As the standard of administration for the control of methods, building and equipment in milk production varies throughout the country, it is held that transfer of the existing powers of local authorities to a central authority offers the only satisfactory solution of the problem. It is proposed that the veterinary staff of the Ministry shall be responsible for the supervision of the conditions under which milk is produced.

3. The producer of T.T. milk at present receives 2½d. a gallon in any case and a further premium of not less than 2d. a gallon if it is sold as such. T.T. producers will now receive a flat rate of 4d. a gallon. The sale of T.T. milk as such at only a slightly higher price to the public will be encouraged.

4. Responsibility for the enforcement of the existing statutory provisions will remain with local authorities.

5. It will be made an offence to sell milk by retail in any scheduled area unless it is:

(*a*) Heat treated as defined by Order.
(*b*) Lawfully sold as T.T. milk.
(*c*) Accredited milk from a single Accredited herd. Milk will be regarded as heat treated if it satisfies the phosphatase test and a special methylene-blue test.

TABLE 12[9]

FAMILIES USING FRESH MILK FOR VARIOUS PURPOSES

	Class AA.	*Class A.*	*Class B.*	*Class C.*	*Class D.*
No. of families	422	466	971	2,124	1,006
	(*Per Cent.*)	(*Per Cent.*)	(*Per Cent.*)	(*Per Cent.*)	(*Per Cent.*)
Puddings	97·9	91·6	91·4	89·8	74·6
Custards	86·7	78·7	80·6	73·4	46·3
Cooking (cakes, etc.)	86·7	77·5	74·6	59·7	36·4
Food drinks	39·1	32·6	30·5	16·4	7·5
Breakfast cereals	64·0	50·8	57·1	49·0	30·9
Tea	97·4	97·4	97·4	91·4	73·0
Coffee	89·1	71·0	60·7	30·0	11·8
Cocoa	33·4	29·8	42·6	52·7	37·7
As a drink (fresh)	56·6	53·4	48·3	36·2	26·3

6. Local authorities will be empowered to install and operate pasteurising plants.

Scotland

Certified and T.T. milk form one-third of Scottish milk, whereas they constitute only 6 per cent. of English milk. In other respects also conditions are better, so that Scotland will only require certain modifications of existing practices.

Northern Ireland

At present all milk has to be sold according to quality grades. The scheme will require certain modifications in Northern Ireland, but in general the same results will be obtained.

(*To be continued*)

NOTE.—Tables mentioned in the text but not appearing in the article will be included in the following instalments, where references will also be found.

Ex-Service Employment

IN the September issue of FOOD MANUFACTURE was published a short statement on the Reinstatement Act. The following presents the matter in greater detail. By the Reinstatement in Civil Employment Act, 1944, it is made obligatory upon the last employer of a person who joined up in the Navy, Army, Air Force, or in one of the women's auxiliary forces, to re-employ that former employee on discharge from the Services—that is, of course, if the returned person wishes to return to that employment; this also applies as regards any person called up for similar service, but by the 1941 Act enrolled in a Civil Defence Force.

The obligation requires the employer to give a returned employee employment in the occupation in which he was last employed before joining up and on terms and conditions as good as those which would have applied had he not joined up. But if it is not reasonable and practicable to re-engage the person in that occupation, the obligation is met if employment is found in the most favourable occupation and on the most favourable terms and conditions which are reasonable and practicable in the case of that returned person.

The phrase "reasonable and practicable" continually occurs throughout the Act, and the interpretation of this is really the fundamental principle of the measure, and the Act gives guidance as to the interpretation of the phrase. For instance, it is stated that an employer is not required to re-employ a returned person if it can only be done by discharging some other person who was employed before the ex-Service person joined up, was at that date a longer established employee, and was in employment as permanent in character as that of the returned employee, such action not being reasonable and practicable. On the other hand, it is considered as reasonable and practicable for an employer to dismiss any other person not of the qualifications just mentioned to find work for the returned person, and this applies whether the sitting employee is under the Act or otherwise. The following examples will better show how the foregoing works. Suppose a person engaged after an employee has joined up afterwards also enters the Forces; both come under the Act, but the first joined-up person has prior rights to a job on return to civil life and the employer is not obliged to re-engage the later joined-up person, if it is not reasonable and practicable to do so, the provisions just explained as regards the term "reasonable and practicable" covering this, and these also cover another aspect of the case. Suppose the substituted employee who had afterwards joined up gets back to civil life before the originally employed person and is re-engaged; when the original employee does return he must be re-employed, but the other returned person is not necessarily dismissed, he is under the Act, and if it is reasonable and practicable to employ him the obligation to employ him remains with the employer. But if there is no suitable job available it is not reasonable and practicable to employ him and the employer is within the law by dismissing him.

Particular Matters

Application for re-engagement is required to be made to the former employer or through an Employment Exchange if the Service person wishes to return to that employment (not, of course, if re-engagement has been arranged otherwise) and until the fifth Monday after Service discharge is allowed for this purpose; the employer must be notified of the date when the returned person wishes to restart and this must be within four weeks from the end of the application period mentioned. Roughly, a returned ex-Service person has eight weeks from date of discharge before restarting such civil work.

Employment must be provided at the first opportunity at which it is reasonable and practicable for the employer to do so after the date given by returned person as when he will be available for work; really, however, the obligation is a continuing one if the returned person renews application every thirteen weeks. This is useful where the firm is one under a Concentration of Industries scheme. On re-engagement employment must run for 26 weeks or for as much of this period as is reasonable and practicable; if the pre-Service employment had been for 52 weeks (or more) then 52 weeks applies instead of the 26 weeks mentioned.

Reinstatement Committees will function up and down the country for settling questions between employers and returned persons, and if a Committee considers that an employer is at fault an Order can be made requiring employment to be found and/or an Order requiring compensation to be paid for any loss sustained by the returned person; such compensation, however, is not to exceed the amount which an employee could receive as remuneration under the provisions of the Act.

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

Road Transport Developments In War-time

GRAHAM SAVILLE

THE MOST important development regarding road transport which has occurred during the period of the present war has been the creation of the Minister of War Transport's Road Haulage Organisation.

The scheme has been in operation for some considerable time, but until recently the Minister of War Transport has had no direct powers to divert traffic to the Road Haulage Organisation.

It is essential for food-manufacturing firms to have a working knowledge of the objects and operation of the concern. The objects have been stated to be to obtain the greatest possible economy in the consumption of motor fuel and tyres and also to make the best use of vehicles.

Division of Territory

The organisation controls the movement by road of all general goods for distances of sixty or more road miles from point of collection to the point of delivery of the goods. In the first place the country is divided into twelve divisions coinciding with the Civil Defence Regions, and each region is under the control of a Divisional Road Haulage Officer. Each division is then sub-divided into areas and each area is under the direction of an Area Road Haulage Officer. Then in each area a considerable number of haulage concerns have been taken over as controlled undertakings, and these form the operating units under the scheme. The total number of units is approximately 350. In connection with each controlled undertaking a unit controller has been appointed, this official normally being a member of the staff of that firm. Certain territory is allocated to each unit, and the unit controller is responsible for all controlled traffic originating in his territory. In the more densely populated districts, several units will have a common territory for originating traffic, but in such cases each unit specialises in traffic for particular destinations.

Functions of Unit Controllers

With the exception of the traffic at certain ports, the unit controllers are responsible for the acceptance of controlled traffic and will also refuse any merchandise which they are of the opinion should be conveyed by some other form of transport—*i.e.*, rail, canal or coastwise shipping. Food concerns should, however, appreciate that when they are not satisfied with the decision of the unit controller regarding the method of transport they have a right to appeal to the District Transport Officer. This appeal can be made direct, or, if a Government Department is interested in the traffic, through the local transport official of that Department.

Food-manufacturing firms will be particularly concerned about consignments which must be consigned by road on account of urgency. In this connection the unit controllers have instructions that when they are informed that traffic should be carried by road on account of urgency, it must be so moved, and any enquiries as to the necessity for using road transport carried out afterwards.

It should be understood that while the object of the Road Haulage Organisation is to deal with traffic conveyed by road for distances of sixty miles and over, it does in actual practice deal with a considerable quantity of short-distance traffic.

Some food concerns use the services of road clearing-houses for dealing with the despatch of their merchandise. While clearing-houses have no official place in the organisation, the Ministry recognises them as agents of the trader. When, however, food concerns use the services of road clearing-houses they have to pay the clearing-houses' charges in addition to the Road Haulage Organisation's charges.

The Road Transport of Goods Order, 1944

An Order came into force on May 22, 1944, which limited the movement of general traffic by road for distances of sixty road miles and over, otherwise than through the Road Haulage Organisation. The Order is S.R. & O. 1944 No. 497, and is cited as "The Road Transport of Goods Order, 1944."

The traffics which are excepted from the Order are parcels and smalls, abnormal indivisible loads and household furniture and effects. The definition of "parcels and smalls" is given as "any consignment of goods which is under one ton in gross weight and is sorted from other consignments at a traffic bank after collection and again before delivery; provided that all goods collected on the same day from the same consignor at the same point of collection for the same point of delivery shall be treated as one consignment."

Food-manufacturing concerns should appreciate that in certain special circumstances permits are granted to enable merchandise to be conveyed otherwise than through the Road Haulage Organisation. These exceptions may be made by the Regional Transport Commissioners by means of permits covering an individual consignment, or class of consignment, or, in the case of individual consignments, by officers of the Road Haulage Organisation.

In the case of "C" operators, permits are normally limited to the carriage of the trader's own goods. In addition, as a condition for the issue of such permits, "C" operators may be required to place the vehicles at the disposal of the Road Haulage Organisation for loading on return journeys.

Where exemptions are issued by officers of the Road Haulage Organisation they are in the form of a consignment note (RH/M/2C). Any such consignment note, and any permit issued in respect of a specified vehicle, has to be carried by the driver throughout the journey and produced by him on demand to a police

constable or to a traffic examiner or other person authorised in writing by the Regional Transport Commissioner.

Food concerns should understand that responsibility rests with the sender to see that the vehicle transporting merchandise is covered by the appropriate permit.

It should be mentioned that the Order does not apply to certain classes of vehicles, but these are not normally of interest to food-manufacturing firms.

Conditions of Carriage

One of the most important aspects of the developments in road transport arrangements is that merchandise carried by the Road Haulage Organisation is only accepted subject to the Minister of War Transport's conditions of carriage.

It is advantageous to be aware of these conditions and attention is drawn to one or two of the clauses which are of special interest to food concerns.

Condition 5 states that all goods shall be adequately packed and addressed in accordance with the trade custom for goods of their kind, and the address shall include the consignee's name and full postal address (including the number of the postal district, if any). The customer shall declare the nature of the goods, number of packages and gross weight of each consignment. In addition, condition 6 indicates that the Minister may at any time require proof of the nature, condition, quantity, weight or value of the goods at the time they are received by him for transport, notwithstanding any declaration made by the customer.

Presentation of Claims

The question of claims is dealt with in condition 7, which lays down that "notice in writing of any loss or damage must be given to the carrier, whose name and address is endorsed on the relative consignment note, within four days of the delivery, or in the case of non-delivery within fourteen days of the time when the goods should have been delivered." Claims have to be made on the carrier whose name appears on the Minister's delivery, consignment and receipt note (Forms RH/M/2b, c and a) except where goods are carried on a vehicle belonging to a Government Department, or one of the Services, when the claim should be made on Minister of War Transport, Road Haulage Organisation, Berkeley Square House, London, W. 1.

The Minister's Liability

Condition 8 states: "The Minister's liability under these conditions shall in no case exceed the rate of £200 per gross ton of the goods lost, damaged or affected, except when the weight of the consignment does not exceed one gross cwt., in which case liability shall not exceed £10 per consignment." The Minister of War Transport has given an interpretation of this condition, indicating:

> "In case of loss of or damage to goods sustained while on a vehicle, this part of the Condition will be construed to mean that claims will not be subject to average but that the limit of liability will be at the rate of £200 per ton of goods carried on the same vehicle for the same consignor."

The whole question of liability is also dealt with in Condition 9, which, after laying down a large number of circumstances under which the Minister will not be liable, states that the Minister will be responsible for damage or loss occasioned by the negligence or wilful misconduct of the carrier, his servants or agents, but not otherwise.

Loading and Unloading

A further condition which is very important to food-manufacturing concerns covers loading and unloading. This reads: "The customer will deliver the goods on to and the consignee will take delivery from the side or tailboard of the vehicle. The Minister will not be responsible for any loss or damage arising from the stowage or unstowage of the goods on the vehicle or from the overloading or unsafe loading of the vehicle arising therefrom, where such stowage or unstowage is performed by the customer or the consignee or his agent by reason of the special nature or his special knowledge of the goods. Nothing in this condition shall be construed as preventing the carrier from giving assistance in loading or unloading the goods on to or from the vehicle where such assistance is customary and practicable, but assistance so given shall be at the sole risk of the customer or the consignee as the case may be, who shall indemnify the Minister and the carrier accordingly."

Other conditions deal with such factors as lien, acceptance, delivery, rates and demurrage.

The Road Haulage and Hire (Charges) Order, 1942

When dealing with carriage of goods by road, food concerns should be aware of the provisions of the Road Haulage and Hire (Charges) Order, 1942, which has an important influence on road haulage charges.

This Order provides that charges for the carriage of goods on roads by goods vehicles or for the hire of goods vehicles or for incidental services must not exceed the amount which would have been fair and reasonable in October, 1940, with an addition of a percentage to reflect increases in costs since that month. This percentage at the present time is 7½ per cent., unless it can be shown in any particular case that a higher or lower percentage should be allowed.

Any question arising as to whether a charge conforms with the Order is decided by the Minister of War Transport acting through the Regional Transport Commissioner in whose region the traffic originated or the hire commenced. The Commissioner has the assistance of two assessors representing road haulage and trade or agriculture.

It should be mentioned that the charges classified as for "incidental services" include those made for the detention of vehicles beyond the customary period or for packing, loading and unloading such vehicles.

Finally, it should be appreciated that charges must be disputed within a month. It should also be borne in mind that the Order refers to a charge which would have been "reasonable and fair" in October, 1940, and it is feasible that road hauliers may in certain instances be able to substantiate increases in rates through their previous charges not adequately covering their costs.

Food Production by Micro-Organisms

Part III

VITAMINS

The final instalment of the series of articles the purpose of which is to indicate some of the main conclusions regarding the synthesis of proteins, fats and vitamins by micro-organisms, and to supply the literature references where more detailed information may be found.

Previous instalments were published in FOOD MANUFACTURE, June and October, 1943.

H. T. FAWNS, M.Sc., F.R.I.C.

THE SYNTHESIS of vitamins and their precursors by micro-organisms has been mainly investigated with regard to their power of synthesising members of the vitamin B complex and ergosterol, the precursor of vitamin D_2. Yeasts and moulds are particularly effective for this purpose and can serve as commercial sources of these factors.

As potential sources of vitamins A, C, E and K, micro-organisms appear to be less thoroughly investigated, and information on the subject is relatively scanty in the literature.

As a source of accessory food factors two main methods of using micro-organisms become apparent: Firstly, feeding the organism itself—*e.g.*, the use of yeast supplements to supply members of the B complex; secondly, the "enrichment method", or inoculation of a food with a culture of an organism producing these accessory factors as a means of increasing the vitamin content of the foodstuff in question.

But whereas micro-organisms have proved themselves useful sources of both protein and fat (see Parts I and II of this series[1]), their application to vitamin synthesis appears to be of less importance (with the above-mentioned exceptions), the reason being, of course, that recent advances in the organic chemistry of the vitamins has made this largely unnecessary. The majority of the known vitamins can now be prepared synthetically, so that when the natural dietetic sources become difficult to obtain, the synthetic product can be used for enrichment purposes or supplied in pure form for clinical use. This tendency is likely to increase further as improved methods of synthesis come into large-scale operation. Despite this, some interesting information is available, which it would appear worthy of putting on record.

This subject is perhaps more conveniently handled if the work is grouped in respect of the individual vitamins rather than the organisms concerned, as has been done in the previous articles in this series.

WATER-SOLUBLE VITAMINS: B COMPLEX AND C.

Vitamin B Complex

The members of this group which appear to be indispensable for human nutrition, so far as is at present known, are set out in Table 1. The necessity for other members of this group may of course be established by later investigations.

Yeasts and products derived therefrom are among the richest sources of these factors. Prescott and Dunn,[3] in reviewing the work on synthesis of vitamin B_1 by yeasts, conclude that while the organism is capable of synthesising this factor when grown on a B_1 free medium, yet it will abstract pre-formed B_1 from the medium in preference when this is available. The nature of the medium is thus just as important, or even more so, than the strain of yeast. In support of this view they quote figures from a paper by Pavcek, Peterson and Elvehjem[4] shown in Table 2.

The higher values for all species when grown on a grain wort medium are due to B_1 initially present in this medium, the yeast serving, as it were, to concentrate this factor within itself.

The vitamin B_1 potency of the yeast was increased

TABLE 1.

VITAMIN B COMPLEX AND HUMAN NUTRITION.

Series.	*American Classification.*	*Chemical Name.*	*Estimated Adult Human Requirements per Day.**
B_1†	F	{Aneurin / Thiamin}	1·5-2·3 mg.
B_2	G	Riboflavin	2·2-3·3 mg.
P-P factor	—	Nicotinic acid or nicotinamide	15-23 mg.

* Values recommended by Committee on Food and Nutrition, National Research Council, U.S.A., quoted by Joliffe and Most[2].

† Nomenclature of B_1: Aneurin, British; Thiamin, American.

TABLE 2.

APPROXIMATE AMOUNT OF VITAMIN B_1 PER GRAM DRY YEAST.

Yeast Type.	*Grain Medium.* (*I.U.*)	*Molasses-salts.* (*I.U.*)	*Glucose-salts.* (*I.U.*)
Bakers' yeast A ..	(10	(3	3
Bakers' yeast B ..	10	3	(3·3
Brewers' yeast A ..	10	(3	(3·3
Brewers' yeast A (medium autoclaved) ..	10		
Saccharomyces logos ..	10	(3	(2·5
Willia anomala ..	(10	4	(3·3
Endomyces vernalis ..	7	5	7

NOTE.—(1) The sign (signifies a value just below the figure cited. (2) One International Unit (I.U.) of B_1 = 3·0 μg. of pure, crystalline aneurin, whence 1 mg. of the pure substance is equivalent to 333 I.U.

if aeration was not used, but against this, the total yield of yeast was smaller under those conditions.

A summary of values obtained for the vitamin B_1, B_2 and P-P factor content of yeast is given by Boas-Fixen and Roscoe[5] and Bacharach,[7] and these are set out in Table 3. For further details regarding the yeasts used, the nature of the medium on which they were grown and methods of estimation, the literature reference lists given in the original tables should be consulted.

VALUES FOR DRIED BREWERS' YEAST

Coward[6] gives values for dried brewers' yeast as ranging from 310 to 1,000 I.U. per 100 gms. Fink and Just[8] on examining *Torula utilis* found values which varied between 34·3 and 45·3 mg. per 100 gms. dry weight for P-P factor, most of these occurring between 37 and 42 mg. The nature of the medium appeared to have little effect on the nicotinic acid content of the product and the organism appeared capable of synthesising the molecule completely, when grown on synthetic medium. A chemical method of estimation was used.

In a later paper, Pavcek, Peterson and Elvehjem[9] showed that when vitamin B_1 was added to the medium either as yeast extract or as crystalline vitamin, from 50 to 100 per cent. of the added vitamin was recovered in the yeast growth. The yeast yield was not influenced by adding B_1, liver extract or nucleic acid.

Trufanov and Kirsanova[10] showed that when yeast was allowed to autolyse vitamins B_1 and B_2 were set free from the cells, so that the amounts detectable rose up to three times the original value, B_1 reaching a maximum after 6 to 10 hours autolysis and B_2 after 12 to 24 hours. Regarding provitamin D, these authors found a similar rise for ergosterol.[11]

The synthesis of members of the vitamin B complex by micro-organisms other than yeasts has been widely studied by biochemists, more particularly the three members in question—viz., B_1, B_2 and P-P factor—the reason being that they form constituent parts of enzyme systems responsible for biological oxidations and are thus intimately concerned with cellular respiration.

Three Classes of Organisms

Generally speaking, organisms can be divided into three classes :

(1) Those which can synthesise the vitamin molecule in its entirety and are thus independent of any external source; (2) those which are dependent on a supply in the medium; and (3) those which can synthesise part of the molecule provided the other component is supplied in the medium. Some organisms of group 2 have been used for biological assay of B-group vitamins—e.g., *Phycomyces blakesleanus* for B_1, and *Lactobacillus casei* for B_2.

Aspergillus niger can produce vitamin B_1 when cultured on B_1 deficient material. Thus, Fawns and Jung[12] found that *A. niger* grown on an experimental B_1 deficient diet would protect rats against beri-beri. The B_1 appeared to be concentrated mostly in the conidia and little if any was imparted to the mycelium or substrate. The animals' condition did, however, show signs of deficiency of other factors. The growth of micro-organisms in a foodstuff to act as a source of vitamin "enrichment" has been applied on a large

TABLE 3.

VITAMIN B COMPONENTS OF YEAST.

I. VITAMIN B_1 (ANEURIN) AND B_2 (RIBOFLAVIN).
(After Boas-Fixen and Roscoe[5]).

B_1 in I.U. per 100 Gms.

Type of Yeast.	*Units.*
Fresh compressed	82
Fresh brewers'	400
Dried	700-1,200
Dried brewers'	600-3,800
Extract	6,000

B_2 in Mg. per 100 Gms.

Type of Yeast.	*Mg.*
Unspecified	0·75-1·20 2·40-2·53
Brewers'	1.48
Dried	12·43

II. P-P FACTOR (NICOTINIC ACID).
(After Bacharach[7]).

P-P Factor in Mg. per 100 Gms.

Type of Yeast.	*Mg.*
Bakers' compressed	25·7*
,, dry	50
,, moist	7·4-12
Bottom	33·9-36·7*
Brewers' dry	34-93
,, moist	9·1-10·2
Fæx medicinalis	55·9-61·2*
Surface	44·6-45·5*
Wine	15·9-17·7*
Extract	47·7-49·7

* On dry matter.

Earlier values are given in previous tables: Boas-Fixen and Roscoe (1938), *Nutr. Abs. and Rev.*, **7**, 823.

scale in some cases, as may be seen from the patent specifications at the end of this article.

However, a literature survey seems to indicate that, despite these numerous investigations, no organism so far examined can compete with yeast as a technical source of the vitamin B complex, *with one notable exception*. In a recent paper, Lee and Burris[13] have succeeded in producing large-scale cultures of *azotobacter* in a 200-gallon pilot-plant yeast fermenter, using molasses as the carbon substrate, and showed that the cell-paste obtained by centrifuging the fermentation mixture had a vitamin B content comparable with, and sometimes richer than yeast. Microbiological assay methods were used for B_2 and P-P factor and the thiochrome chemical method for B_1. Other members of the vitamin B complex—viz., biotin and pantothenic acid—were also assayed and results were equally good for these. Their results are set out in Table 4, together with average values for brewers' yeast, which they cite for comparison. The authors' original values, expressed per *gram* of material, have been converted to 100 *gms.* to bring them into line with other values quoted.

Preliminary experiments with sucrose were followed by growth on molasses as a cheap commercial source of carbohydrate.

Azotobacter vinelandii was grown on Burk's[14] mineral salt solution plus 2 per cent. sucrose, subsequently replaced by high-test Cuban molasses. Sodium molybdate (0·1 p.p.m. Mo) and ferrous sulphate (3 p.p.m. Fe) were added. Growth temperature was 30° C. and *p*H 7·2.

Cultural Technique

First generation cultures were grown in twelve 6-oz. bottles containing 15 ml. medium per bottle. After 24 hours, twelve Roux bottles, each containing 100 ml. medium, were inoculated with these cultures. These were aerated with a sterile current of air for a further twenty-four hours and used to inoculate the final medium, which was set up in a 200-gallon yeast fermenter, fitted with a motor-driven air blower (unfiltered) and steam and water coils for maintaining temperature at 30° C. 250 to 300 L. of medium were placed in the fermenter, sterilised at 10 lbs. for 2 hours and cooled, prior to inoculation. Fermentation was carried out under continuous aeration for 30 to 34 hours, samples for analysis being withdrawn periodically from a jet at the bottom of the fermenter.

At the end of fermentation the cells were concentrated in a power-driven separator of the type used for yeast manufacture. Two passages reduced the volume from 300 to 50 litres. This was further concentrated by passage through a Sharples centrifuge at 35,000 r.p.m. to give a cell-paste containing 80 to 85 per cent. moisture. A yeast press was not available, but the authors consider this would have proved equally suitable for recovering the cells.

Production of Protein

Apart from supplying B group vitamins in amounts comparable to yeast, the process offers possibilities for producing edible protein from any cheap source of carbohydrate by fixation of atmospheric nitrogen. Since organisms of the azotobacter group are peculiar in their power to grow on an N-free medium, the danger from contamination by other organisms is greatly reduced. The overall efficiency of the conversion of sugar to cells (dry wt.) was 15 per cent. Yeast, grown on grain-wort medium under optimum conditions, can show a conversion efficiency up to 30 per cent., but this is partly off-set by the specific advantages of azotobacter outlined above, and the authors point out that improvements in cultural conditions—*i.e.*, aeration, age of inoculum, etc—may well increase the yield further and cut down fermentation time. (Presumably a residuum from the main fermentation plant could be used as a " starter " for subsequent runs and thus avoid the work of " building up " an inoculum.)

Table 5, quoted from their paper, gives the efficiency of nitrogen fixation on a molasses medium during a

TABLE 4.

VITAMINS OF B COMPLEX IN CELLS OF AZOTOBACTER VINELANDII.

	B_1—*Thiamin.*		B_2—*Riboflavin.*		*P-P Factor—Nicotinic Acid.*	
(*Mg. per* 100 *Gms.*)	*Cells.*	*Medium.*	*Cells.*	*Medium.*	*Cells.*	*Medium.*
On sucrose	3·3	0·0	35·0	0·1	59·0	0·3
On molasses	9·6	—	30·4	—	48·0	—
Brewers' yeast (average) ..	4·0	—	50·0	—	55·0	—

NOTE.—The values for medium, assayed in the case of sucrose experiments, refer to cell-free supernatant fluid after centrifuging.

TABLE 5.

EFFICIENCY OF CELL PRODUCTION AND NITROGEN FIXATION.

Time. (*Hrs.*)	*N Fixed.*	*Dry Wt. of Cells* (*Mg. per* 100 *Ml.*)	*Sugar Used.*	*Mg. N Fixed per Gm. Sugar.*	*Sugar Converted to Dry Cells.* (*Per Cent.*)
0-8	2·16	16·14	200	10·8	8·2
8-14	7·65	56·9	362	21·2	15·7
14-20	12·28	98·9	690	17·8	14·33
20-26	5·04	50·0	302	16·7	16·55
26-32	4·08	41·7	252	16·2	16·19

32-hour run. For further details of azotobacter in this respect, see Part I of this series.

One possible objection to the above technique is the introduction of traces of molybdenum (0·1 p.p.m.). It is questionable whether such a low concentration of this element would be harmful to humans or farm stock, but its continued ingestion over a long period might produce a cumulative toxic effect, and that point would have to be kept in mind.

Improved results or further applications of the azotobacter group might arise by experimenting with other strains of the organism. They appear capable of using a very wide range of N-free carbon compounds as substrates (Waksman[15]). Starkey and De[16] have isolated a strain—*Azotobacter indicum*—from Indian soils, which will fix nitrogen within the *p*H range of 4·9 to 5·2, whereas other strains will only do so within the limits of *p*H 8·3-5·9, with an optimum at about 7·5. If *Azotobacter indicum* proved as efficient a converter as *Azotobacter vinelandii*, it would open up the possibility of utilising acid organic wastes, with a *p*H too low to support the growth of most other organisms. This low *p*H value would be an additional protection against contamination.

Vitamin C

The usual plant sources and the synthetic product are available in sufficient quantities to make the use of micro-organisms superfluous, and they have been less investigated in regard to this factor for that reason. Yeast contains 1·6 mg. per 100 gms.[5] Lunde and Lee[17] investigated the vitamin C content of marine algæ. Chemical and biological estimations were both used and generally agreed well. Values ranged from 4 to 140 mg. per 100 gms. *wet weight*, which thus makes them an important source of this factor. But in view of the alternative sources so readily available, it seems doubtful whether their collection or cultivation on a large scale would prove a profitable matter unless they provided other important dietary constituents at the same time.

It might be noted that ascorbic acid is frequently synthesised from *l*-sorbose, and this latter is readily prepared from *d*-sorbitol (obtained by chemical reduction of glucose) by fermentation of the sorbitol with various species of acetobacter. Thus, Fulmer *et al.*,[18] using *A. suboxidans*, obtained yields up to 80 per cent. from *d*-sorbitol by this method.

FAT-SOLUBLE VITAMINS, A, D, E, K

Vitamins A

Many micro-organisms contain carotinoid pigments capable of acting as provitamin A—*i.e.*, they can be converted into vitamin A when ingested by mammals. The presence of pre-formed vitamin A does not seem to occur to any extent, and in no case do they appear to offer a source of this factor, either pre-formed or as carotinoid precursors, comparable with fish-liver oils.

Some interesting work by Tischer [19] has shown the presence of carotinoid pigments in algæ, both α- and β-carotenes, and further carotinoid pigments "aphanin" and "aphanicin," which have been shown to have vitamin A activity. The former was shown by Scheunert and Wagner[20] to have activity approximately half that of β-carotene. Rosenberg[21] mentions a further active pigment, "myxoxanthin," from algæ.

The vitamin A content of yeast is given as 110 γ per 100 grams (Boas-Fixen and Roscoe[5]). It is classed as containing both vitamin A and carotinoids.

Vitamins D

The active vitamins do not occur as such in micro-organisms, but their sterol precursors, which yield the active vitamins upon irradiation with ultra-violet light, are widely distributed among them, more particularly among yeasts and fungi, which serve as a commercial source of these provitamins.

The number of compounds showing vitamin D activity and their sterol precursors are increasing considerably, and a summary of the situation up to 1942 is given by Rosenberg,[21] whose table is quoted below (Table 6). Of these, ergosterol is the member commonly found among yeasts and fungi and yields vitamin D_2 (calciferol) upon irradiation. It was first isolated from the fungus, ergot, by Tanret in 1889.

Bills[22] gives the following information regarding the occurrence and yield of sterols in yeasts and fungi:

(1) There are indications that sterols can be formed at any stage in the life-cycle.

(2) Sterols can be synthesised from simple carbon compounds and the bulk of evidence points to their being products of carbohydrate metabolism rather than of fat. Thus, ergosterol was obtained from *Penicillum glaucum* grown on sucrose and tartaric acid, and a sterol, probably ergosterol, was extracted from *Mucor mucedo* grown on lactose. *Penicillium puberulum* and *Aspergillus fischeri* both produced ergosterol when cultivated on glucose. In the case of yeasts, the amount of sterols formed bore a direct relationship to the type of carbohydrate substrate, but no direct relationship to the fat or protein content of the yeast cells. Further, if sulphite was added to the sugar solution there was a marked decrease in the sterol production but little or no interference with the production of fatty acid. The argument is put forward that, in the formation of sterol, an aldehyde removable by sulphite comes into the picture between the hexose and the final product.

(3) Both the type of yeast and the nature of the sugar fermented influence the yield of ergosterol. Twenty-nine yeasts cultivated under uniform conditions gave yields of ergosterol varying between a trace

TABLE 6.

D-Group Vitamins and their Sterol Precursors (1942).

Vitamin D.	*Provitamin D.*	*Remarks.*
D_1	Ergosterol	Vitamin D_1 is a molecular compound consisting of vitamin D_2 and lumisterol$_2$.
D_2	Ergosterol	Vitamin D_2 is also called calciferol or viosterol.
D_3	7-Dehydrocholesterol	Vitamin D_3 is also referred to as dimethyl-dihydro-calciferol.
D_4	22-Dehydrocholesterol	
D_5	7-Dehydrositosterol	

only (*Saccharomyces logos*) and 2 per cent. (*Saccharomyces carlsbergensis*). Conversely, one single strain (*Saccharomyces cerevisiæ*) gave widely variable yields according to the nature of the sugar used, when seven different sugars were tried out. Far greater amounts were synthesised on tri- and di-saccharides than on the simple hexoses resulting from their hydrolysis, when used either singly or mixed.

Aspergillus niger can synthesise ergosterol when sodium acetate is the sole source of carbon[23, 24]. For further details the original papers should be consulted.

Irradiation

For preparing concentrates, the sterols are extracted from the non-saponifiable fraction of the fats and irradiated, with or without further separation of the ergosterol from the inactive sterols accompanying it. The actual irradiation of yeast itself is carried out commercially.

Vitamin E

The possible occurrence of this in micro-organisms does not appear to have been investigated. Wheat-germ oil and the synthetic product appear to satisfy present requirements.

Vitamin K

There are two natural sources of this factor, K_1 or 2.methyl-3.phytyl-1.4.naphthoquinone, and K_2 or

PATENT LIST. (*After Rosenberg.*[31])

Patent No.	*Date.*	*Patentee.*	*Abstract.*
General.			
U.S. 1,756,574	29/4/1930	J. Takamine, Assr. to Takamine Ferment Co.	Vitamin product from propagated fungi such as Aspergillus.
U.S. 2,128,845	30/8/1938	R. P. Myers and S. M. Weisberg	Whey is fermented by a lactose fermenting micro-organism to produce a product rich in vitamins.
U.S. 1,526,032	10/2/1925	J. A. Wessener	Vitamin-containing food by mixing steep-water with yeast followed by evaporation.
U.S. 1,590,837	29/6/1926	H. Liebers	Addition of yeast to cheese to increase its vitamin content.
U.S. 2,194,672	26/3/1940	C. M. Porter, L. V. Porter and E. Hurlock	Food product rich in vitamins from lacto-bacillus cultures.
B. 378,399	24/3/1931	L. W. Mapson, J. T. McCurdy, H. O. Nolan, and Cambio Products, Ltd.	Edible vitamin-containing food products by autolysis or fermentation of animal or plant material.
G. 661,503	20/6/1938	P. Lindner	Assimilation of alcohol and/or CO_2 by yeast or algæ to form vitamins.
Vitamin B Complex.			
U.S. 2,202,161	28/5/1940	C. S. Miner, Assr. to Commercial Solvents	Recovery of vitamin B components from fermentation of molasses with butyl alcohol-producing bacteria.
U.S. 2,068,623	19/1/1937	O. Warburg, Assr. to Schering	Isolation of yellow oxidation enzyme from yeast.
G. 632,366	7/7/1936	Schering	Riboflavin-phosphoric acid ester from yellow oxidation ferment from aqueous yeast extract.
Vitamin D and Pro-Vitamins.			
U.S. 1,733,009 B. 292,133 G. 549,110	22/10/1929 14/6/1927 17/6/1927	A. Gams and F. Locher, Assr. to Ciba	Isolation of ergosterol from yeast or other fungi by saponification with aqueous alkali and skimming off the crystallised ergosterol.
U.S. 1,724,706 U.S. 1,840,756 B. 322,465 G. 517,499 G. 520,853	13/8/1929 12/1/1932 2/1/1930 4/2/1931 16/3/1931	E. Walz, R. Griessbach and O. Ambrose, Assrs. to Winthrop	Extraction of ergosterol from autolysed yeast.
U.S. 1,893,317	3/1/1933	A. Zimmerli, Assr. to Acetol Products	Process of isolating ergosterol from mycelium of *Aspergillus niger* by extracting the mycelium with alcoholic alkali and re-extracting the alcoholic residue with ether.
U.S. 2,059,980	3/11/1936	W. G. Bennet, Assr. to Standard Products	By cultivating yeast in the presence of an oxidising agent the ergosterol content is increased.
U.S. 2,057,399	13/10/1936	H. Steenbock, Assr. to Wisconsin Alumni Foundn. Research	Yeast is antirachitically activated by treatment with light rich in U.V. rays.
U.S. 1,920,587	1/8/1933	A. J. Pacini, Assr. to Sun-A-Sured, Inc.	Method of producing vitamin D comprising suspending lipoids such as cholesterol and treating them with *Aspergillus oryzæ*.
B. 295,757	23/8/1928	I. S. MacLean	Yeast is incubated in a solution containing phosphates and carbohydrates, and the sterols or sterols and fats obtained are subjected to activating radiation.
B. 396,206	10/8/1933	Internat. Yeast Co.	Cultivation of yeast rich in ergosterol by aeration.
Austrian 140,190	10/1/1935	W. Halden	Cultivation of yeast high in ergosterol under aerobic conditions.

2.methyl-3difarnesyl-1.4.naphthoquinone. K_1 occurs mostly in the green, leafy tissues of plants and K_2 is widely distributed in micro-organisms. Both have anti-hæmorrhagic properties, being concerned with the production of pro-thrombin. According to Rosenberg[21] the distribution of K_2 is mainly confined to bacteria, particularly those types that inhabit the alimentary canal, while yeasts and moulds contain practically none. Its presence in a large number of bacteria has been shown by Almquist, Pentler and Mecchi[25]. In view of the long side-chains contained in these molecules, phytyl in the case of K_1 and difarnesyl in the case of K_2, their synthesis on a large scale would prove no easy matter and both plants and micro-organisms might have proved valuable sources of them. However, a simpler synthetic analogue, 2.methyl-1.4. naphthoquinone, has proved to be clinically active and this is likely to supplant the natural products.

Summary

The use of micro-organisms as a source of vitamins appears to be limited to certain conditions:

(1) Where the material provides a good source of protein and/or fat as well as the accessory factors concerned—*e.g.*, yeasts, certain moulds and possibly azotobacter.

(2) Where the organism produces a precursor (or pro-vitamin) which can be converted into the active vitamin by chemical or physical means—*e.g.*, the extraction of ergosterol from yeasts and moulds, which forms vitamin D_2 upon irradiation with U.V. light.

(3) Where micro-organisms can be used to produce a compound required for the synthesis of the vitamin—*e.g.*, the production of *l*-sorbose from *d*-sorbitol by species of acetobacter, and the use of this *l*-sorbose for the synthesis of ascorbic acid (vitamin C).

(4) In common with other naturally occurring sources of vitamins, their uses are further limited by competition with the synthetic products. Rosenberg[21] gives a list of the patents relating to vitamins, and it is significant that the majority of these are concerned with methods of synthesis. Those that appear relevant to the subject under review have been abstracted and are listed below.

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CORRESPONDENCE

Vitamin P Concentrates

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—In your issue of September (FOOD MANUFACTURE, 1944, **19**, 317) an interesting article by Dr. V. L. S. Charley contains a reference to vitamin P that is not quite consistent with the findings in this laboratory, on which we believe his figures to be based. He states that a material extracted from black-currants by Dr. Pollard (misspelt as Follard in the article) had 10,000 times the activity of an average freshly expressed juice. We have never examined such juice, but have carried out a number of determinations on *purée*, and one on fresh fruit: these are reported in a paper just published (*J.S.C.I.*, 1944, **63**, 198). There was a marked inconsistency between the figure obtained for the fruit, which was rather under 100 units per 100 grams, and those calculated from *purée* on the basis of information supplied to us by Miss M. Olliver, of Messrs. Chivers and Sons, Ltd., which were round about 600 units per 100 grams. We were not able to put forward any satisfactory explanation of this discrepancy, of which there are further indications from an assay carried out on this season's fresh fruit; this gives a value of 130 units per 100 grams. The concentrate supplied to us by Dr. Pollard was examined some two years ago, and the result was reported at the end of 1942 (*Analyst*, 1942, **67**, 799) as 1·06 million units per 100 grams. According, therefore, as we take the figure for fruit as 100 units per 100 grams or as 600 units per 100 grams, and assuming that of the juice to be the same, Dr. Pollard's concentrate can be described as having 10,000 times the potency of fresh juice, which is Dr. Charley's figure, or as having rather under 2,000 times the potency, which we regard as more likely. It is to us inconceivable that the process of making black-current *purée* from fresh fruit should lead to a sixfold increase of vitamin P activity, and we are of opinion that, for reasons unknown, the test fails to assess the full amount of vitamin P present in this fresh fruit.

Yours faithfully,

A. L. BACHARACH,
M. E. COATES.

Biochemical Department,
Glaxo Laboratories, Ltd.

The Excess Profits Tax

IMPORTANT alterations having taken place in the Excess Profits Tax by the Finance Act, 1944, being concessionary alterations, we give this short article, explanatory of the scheme as it is, up to date with these new provisions included.

The tax is roughly any excess of profits currently over pre-war profits (termed "standard profits"), which profits are those in what is called a "standard period." The taxpayer has certain options as regards the period (that is, the year) to apply; thus the "standard period" can be either for (*a*) 1935 or 1936, for (*b*) 1936, or for (*c*) any consecutive twelve-months period ending before July 1, 1937; (*a*) applies for a business commenced before January 2, 1935, (*b*) if commenced between January 1, 1935, and January 2, 1936, and (*c*) to a business commenced between January 1, 1936, and July 2, 1936. For (*a*) and (*b*) two years' profits can be taken instead and divided by two, for (*a*) either the years 1935 (or 1936) and 1937, for (*b*) 1936 and 1937.

For all businesses commenced before July 2, 1936, the "standard profits" are adjusted according to the capital employed currently, thus for increases in capital over that used in the "standard period" 8 per cent. of the increase applies for companies, 10 per cent. for other concerns including director-controlled companies; for decreases 6 per cent. of the decrease applies for all firms.

Standards Not Profit Standards

For all businesses commenced after July 1, 1936, the amount of "standard profits" is based on capital, being for companies 8 per cent. of the average capital used currently, 10 per cent. for other concerns (including director-controlled companies), this being called the "statutory percentage"; in some cases the capital amount can be increased by any losses sustained from start of the business to March 31, 1939.

Where a firm was not doing well in any of the standard periods, so that to take the profits as a standard would not be altogether fair, the Commissioners, on application, may allow another sum called a "substituted standard," this being computed by assessing interest at 6 per cent. on the ordinary share capital (director-controlled companies 8 per cent.) plus the fixed rate payable on any other share capital; in some cases assets can be taken into account. Concerns not companies (that is, individual traders or partnerships) are treated the same as director-controlled companies, the net capital balances being treated as ordinary share capital.

For post-July 1, 1936, concerns, and those under the "substituted standard" provisions, as above, the amount taken as "standard profits," to apply after April 1, 1944 (the accounting year beginning after April 1 each year applies for E.P. Tax as the chargeable accounting period), is to be increased by £1,000, this concession being by the Finance Act, 1944.

There is also what is known as the "minimum amount" which can apply instead of actual pre-war profits, against current profits, this amount up to this Finance Act, 1944, having been £1,000, which mostly applies to ordinary companies or to concerns carried on by a person not taking an active part in the business; this £1,000 by the Finance Act, 1944, now, from April 1, 1944, becomes £2,000, but for concerns with "working proprietors" the position is somewhat different, as will be seen. The term "working proprietor" means a proprietor who has for more than one-half of the chargeable accounting period been engaged full time in the management of the business; for a partnership the term "proprietor" covers a partner, or, if a company, any director owning more than 5 per cent. of the share capital. These "working proprietor" rules apply to concerns carried on by a single individual (*a*), by a partnership (*b*), or by a director-controlled company (*c*). Until this 1944 Finance Act, instead of just the £1,000, the amount to apply for the "minimum amount" has been computed by allowing £1,500 for each "working proprietor" up to a maximum of £6,000 and the additional £1,000 now applies to such concerns—that is, to the concern, not each proprietor. But if the case concerns a (*b*) or (*c*) type of firm as above, and there are three or more working proprietors, the extra £1,000 may become £2,000 (if there are four), the actual increase being by allowing £500 for each "working proprietor"; it will be seen that the £1,000 increase where there are two "working proprietors" returns £500 for each proprietor, thus the same as £500 each where there are three or four.

Furthermore, applying to (*a*), (*b*) and (*c*) types of firms above, if the Commissioners are satisfied that the ordinary amount which the "working proprietor" rules produce is inadequate considering the nature and size of the business, they can further increase the amount by allowing an additional sum, not exceeding £1,000, for each "working proprietor" (not more than four) or £4,000 in the aggregate.

Points to Note

The following points may be useful when considering the "minimum amount" rules:

Principal's drawings, etc., are not deductible for an ordinary concern or partnership, and directors' fees are treated similarly for director-controlled companies, although remuneration for any director required to devote substantially the whole of his time to the service of the company in a managerial or technical capacity and who does not own or control 5 per cent. of the ordinary capital is deductible.

For other companies, including those not eligible for the "working proprietor" amounts, directors' fees are deductible, and this is doubtless why they are outside the "working proprietor" rules, and why for director-controlled companies the additional sums for "working proprietors" are allowed; the reason why ordinary firms, partnerships, and the like are allowed the "working proprietor" additional sums, whereas those firms with the owner not taking an active part in the business are not, is that drawings as shown are not deductible, but the last-named type of firm would have a manager run the concern, and his salary would be deductible as a trading expense.

Cleaning of Stills and Tanks

THE Factory Department of the Home Office has just issued a revised version of Factory Form 814—"Memorandum on Explosion and Gassing Risks in the Cleaning, Examination and Repair of Stills, Tanks, etc." (H.M. Stationery Office, price 4d. post free).

The revision of this Memorandum was in progress, in co-operation with the Works Technical Committee of the Association of British Chemical Manufacturers, when war broke out and the work had to be suspended. It has recently been possible to resume and complete the revision and the present edition is the result. In connection with this work, the Works Technical Committee prepared a summary of the precautions recommended in a convenient collected form and of a size suitable for attachment to the Memorandum.

Summary of Precautions

I. GENERAL—APPLYING TO ALL CONDITIONS.

(*a*) *Mechanical.*

Provide at least two manholes where possible (see s. 27 of the Factories Act, 1927).
Isolate from every possible source of danger by completely disconnecting all pipe-lines. Blank off inlet pipes.
Lock all valves and moving machinery.
Remove all dangerous material.
Inspect and certify by competent person.
Use no lamp containing paraffin or other inflammable liquid inside vessels.
Have fire extinguishers and resuscitation apparatus available and rescue appliances handy.

(*b*) *Electrical.*

Regularly maintain and supervise all electrical equipment.
Protect wiring and cables in certain cases.
Properly bond and earth pipe-lines, etc., against static electric charges and stray earth currents.

II. WITH AN UNPREPARED VESSEL.

It is necessary to:

Clean by steaming or other appropriate method, and remove sludge or scale, with the necessary precautions as prescribed.
Test and certify the vessel by a competent person before entering, unless breathing apparatus and life-belt are worn.
Test specially for arsine and hydrogen sulphide and beware of nitrous fumes during welding.
Use preferably a certified flame-proof battery lamp, or—with a cable lamp—interlocked socket and earthed cable.
Take care in using a portable electric blower.
Earth all electrical apparatus.

It is NOT *permitted to:*

Use or bring naked lights near.
Carry matches or lighters.
Use iron or steel dip rods or tools; or footwear likely to cause sparks.
Enter without breathing apparatus and life-belt.
Use a canister respirator.
Use iron or zinc implements in acid tanks.
Use uncertified portable electric appliances.

III. WITH A PREPARED AND CERTIFIED VESSEL.

It is STILL *necessary to:*

Maintain ventilation and supervision from outside.
Wear breathing apparatus if welding or using blow lamps.
Keep pipe-lines disconnected and valves and machinery locked.
Watch for evolution of gas from residues and crevices.
Re-test (or re-clean and test) plant standing idle after original cleaning.
Guard against electric shock.
Give workers rest periods in the open air.

It is permitted to:

Use a naked light, or uncertified lamp.
Use portable electric appliances, if properly earthed.
Use iron and steel tools.
Enter without breathing apparatus and life-belt.

NOTE.—*The above summary is based on Factory Form 814, but is issued by the Association of British Chemical Manufacturers and has no official significance.*

The Soya Bean in War

ONE of the interesting stories of modern agriculture in the United States concerns the soya bean and its rise as a crop of the first order, particularly during this war-time. The story goes back to about the close of the nineteenth century, when only eight varieties of soya beans were being grown in the U.S.A. Nobody knew much about the crop, and few cared to know more.

Before 1920, however, the U.S. Department of Agriculture began to explore seriously the possibilities of the soya bean. The story of its later growth and its development as a crop for oil and meal and food is a part of the story of Dr. W. J. Morse, a Department of Agriculture scientist, who was often referred to by his friends and by farmers as "Soya bean" Morse.

"Soya bean" Morse went to the Orient. He studied the plant as well as the bean itself. He gathered some 5,000 samples of the soya bean he so firmly believed in and took them back to America. New varieties were thus brought in; breeding work was speeded up; fertiliser and cultivation tests were carried on; new uses were sought. By 1939 soya bean plantings in the U.S.A. had reached 4,500,000 acres, by 1941 the acreage was up to 5,750,000. This year there are nearly 9,000,000 acres of soya beans for oil alone.

In addition to developing new high-producing varieties suitable to a wide range of soil and climate, State and Federal plant breeders have teamed up with home economists, soya bean industry representatives, insect and disease control experts, and others interested in the crop. Together they have placed soya beans among the nation's "big six" in its share of farm acreages. Then, too, they have learned to make and use soya-bean flour, soya sausage, soya soup, soya paint. Soya beans in great quantities are going into high protein meal as a feed for livestock. But greatest of all soya bean products is oil for war.

War in the Far East cut the U.S. off from its former source of 1,000,000,000 pounds of fats and oils, but by 1943 the nation extracted more than a billion and a half pounds of oil from one crop of the miracle bean. After the oil crushers had finished, the meal that was left was used for food and feed.

When this war ends soya bean growers can take satisfaction in the knowledge that their labour, and land, and management went into the production of a crop that helped in bringing victory. The soya bean will remain an important crop in peace-time production.

The Factory Canteen

C. T. H. GILBERT

Vice-President of the Industrial Catering Association.

AT THIS stage of the war, with industrial catering firmly established as a necessary adjunct to the maintenance of production, and with some forty-four and a half million meals served in canteens weekly, it is interesting to note that as recently as 1937, when industrial catering was truly the Cinderella of the catering trade, many firms viewed canteens as either necessary evils or something to be avoided for as long as possible. At that time a step was taken by several well-known and successful industrial catering managers to set about the task of pooling knowledge and experience, and of raising the standard of industrial catering to a level which was then not too frequently met with. Thus came about the formation of the first Association for industrial caterers, the Industrial Catering Association, an association for managers with ideas and ideals.

The Canteen Manager

It was frequently felt by the founders of the Association that the most satisfactory way to run a canteen was for the firm to employ an experienced and qualified catering manager as a departmental head, and to give him a free hand to organise and be solely responsible for the satisfactory and efficient running of the canteen. With this conviction firmly established, membership of the Association was then confined to those people holding managerial posts in industrial, institutional, and other catering of a non-profit making nature. The Minister of Labour has recently underlined one of the Association's earliest contentions, when he remarked that "final responsibility for canteen staff ought to rest with the principal employer in the factory." To-day the membership of the Association includes most of the caterers throughout the country who are directly employed by the firm for whose employees they cater.

The factory owner and company executive is in a position to use his club for meals when so inclined, and in the amenities of his club he expects to find every efficiency and comfortable facility. So ought the canteen to be a place of which the workpeople can be proud; a place for them to dine in comfort, in light, airy, pleasant surroundings, and be afforded every reasonable amenity. If a canteen is being provided for the workers, it is just as easy to do the job properly from the start, and avoid the many pitfalls which have made themselves so painfully apparent in the past, as it is to allow slipshop methods to become established under the guise of wartime difficulties, and which will only lay the foundations for constant trouble and dissatisfaction.

Catering—A Personal Business

Catering is a peculiarly personal business. No two hostels or restaurants are just alike, neither can canteens be subjected to general regimentation. The requirements of individual factories vary considerably; the type of work and the type of employee differ greatly; whilst the trend of local customs and habits must be taken into consideration. This, therefore, requires that the factory owner who is sufficiently concerned with the welfare of his employees should set up a canteen as an integral part of his factory, just as he does for the stores, buying, warehouse, costing, clerical, and so on, and as with those departments, he must then employ a competent departmental head, exercising the same careful, considered choice as he does for any other department. The fallacy which persists even today with many industrialists that "anyone can run a canteen," is dangerous, and does grievous harm to the industrial catering trade. Only the best caterer they can obtain should be entrusted with this job; the results and the degree of satisfaction are the measure of ability.

Here another word of warning! If the catering manager is worthy of employment it is unfair to saddle him with all kinds of unnecessary restrictions and interference. Give him a free hand, and make him directly responsible to the directors of the company. The right type of manager will not be attracted otherwise.

Customer Service

Having made such an appointment, everything else can safely be left to the catering manager. Knowing the extent of the overheads he is expected to meet—*e.g.*, wages, heating, lighting, replacement, etc.—his sole concern then becomes service, and the welfare of his customers. The canteen customers to him are equally important as society customers to the West End hotel and restaurant. He should be able to ensure that the canteen is able to hold its customers irrespective as to outside competition, and this demands attractive and varied menus—there is no reason at all why the canteen customer should be restricted only to one or two dishes from which to choose, even in wartime.

Good buying in the open market can ensure the use of only first-grade raw materials at competitive prices which, coupled with good menu planning, good cooking, and efficient service, will obtain for the factory employee a quality and quantity of food at a price which cannot be bettered by any other method of management, and indeed cannot be achieved by some.

Canteen Employees

A thorny problem with many factory owners is to know what rate of pay should be made to canteen employees. Let us immediately recognise the fact that the canteen worker does harder work than over 90 per cent. of the factory employees. From starting time until, say, noon, the work requires a concentration of energies, correctly applied, to ensure that the menu is ready for service at zero hour. At this point, instead of being able to take half an hour's relaxation, or as in the case of the factory worker, the lunch break, the climax of the morning's work is hard upon the canteen

staff—a quick, continuous, and exacting service which lasts until, say, 2.15 p.m. Therefore, canteen workers' rates of pay should be not less than the standard rate paid in the factory, and senior grades—*e.g.*, cook, assistant cook, cashiers, etc.—at correspondingly higher rates, with meals supplied free. A reasonable wage level will attract that desirable type of staff which will in turn show dividends in the way the food is prepared, cooked, and served.

Nutrition

Of recent years there has been a growing appreciation of the theory of nutrition, and the whole of the Government's wartime food policy has been based on scientific nutritional facts. Unfortunately, workers in general are heavily biased against what they consider "faddy dietetic theories", although they are slowly beginning to realise that there must be something behind this "vitamin business".

In the recent scientific survey of canteen meals, samples taken from canteens managed by members of the Industrial Catering Association proved to have a higher vitamin C content in the one meal than the Ministry of Food laid down as a satisfactory level for the whole day, while the calorific value and protein and iron content showed that due consideration had been given to sound nutritional values in producing the meals and in fixing the size of the portions.

Unfortunately, much of the valuable vitamins are contained in raw vegetables, salads, and types of meals which are not readily demanded or accepted by factory workers.

The industrial catering manager must therefore combat prejudice towards certain foodstuffs by a careful study of his menus and cooking procedure, so as to ensure that the factory workers do in fact get a maximum vitamin intake with their meals—and wherever possible in dishes which they like—without their actually being aware of it. Thus, the health and energy of the factory employee is sustained on a satisfactory level, and is a contributing factor in combating absenteeism. It should also be part of the canteen service to supply suitable meals to employees on special diets—a service deeply appreciated by those concerned, and well worth the litle extra organisation and work entailed. The favourable reaction such services create spreads far beyond the confines of the factory itself.

From the financial angle there is no reason why the canteen should be a liability, but a sparkling asset to any firm.

Buying for the Canteen

Caterers usually base their selling prices on the fact that, in addition to the cost of foodstuffs and other goods intended for resale, overhead expenses have to be met out of the sums realised by sales. Overhead expenditure comprises the cost of such items as rent, wages, lighting, fuel, insurance, depreciation, laundry, linen, china, glassware, repairs and maintenance.

Costing offers a method of finding out whether the prices at which goods (dishes) offered for sale will provide a margin or gross profit adequate to cover overhead expenditure. It follows, of course, that costing will also show whether menu prices are too high. The experienced caterer will always have an eye to this aspect when taking out costs.

The caterer, then, when shaping his trading policy, must watch these three things: Probable turnover; known cost of overhead expenses; probable cost of foodstuffs for re-sale.

Estimating Turnover

There are ways of estimating to a reasonable degree of accuracy the average turnover of most catering establishments. In the case of a new business there is an upper limit governed by such factors as seating capacity, trading hours and customers' spending power. There is also a lower limit beneath which it is known that turnover must not fail if the business is to pay its way. For a business already established the records which are usually kept will form a reliable guide.

"Known cost of overhead expenses" requires, perhaps, some further explanation. Many of the expenses which go to make up the total of overhead are susceptible of adjustment from time to time, but only within certain limits. There is, and always will be, in every business, a hard core or irreducible minimum of expense beyond which further so-called "economies" would produce defects in the organisation quite disproportionate to the apparent immediate saving in cash.

"Known cost of overhead" is, therefore, the cost of maintaining an adequate and efficient organisation for preparing and serving such food as the caterer proposes to offer for sale. Overhead expenses cannot be reduced proportionately to every fall in turnover, however prolonged some of these may be.

So far, then, it seems that the problems of the catering trade are very similar to those of any other retail trade. But, because of certain factors peculiar to catering, its costing problems are more complex than those of almost any other.

Caterers deal in a very wide range of perishable foodstuffs and commodities, the cost prices of which, for many reasons, fluctuate violently. Food prices are affected, for instance, by the vagaries of weather and politicians, to mention but two of the most potent forces for unsettlement. The effects of these on prices are frequently sudden, prolonged and almost entirely unpredictable: they may be adverse or favourable.

The perishable nature of most foodstuffs precludes any possibility of buying against an unfavourable period of any appreciable duration. The most efficiently managed catering concern is, therefore, importantly affected by the rise and fall of market prices. Hence the need for constant vigilance and costing.

Now, if mere costing, followed by the automatic adjustment of menu prices, were of itself sufficient to maintain a correct relation between expenditure and receipts, the caterer's problem would be easy of solution; but such is not the case.

Costing

Because of the widely varying and intermittent nature of the rise and fall in the costs of foodstuffs, and more especially because of the unpredictable duration of such rise and fall, the adjustment of menu prices can seldom keep pace with events. Furthermore, owing to the public importance of its function, the catering trade should always be, and usually is, highly sensitive to public opinion and the reactions of its patrons. Whether these be dining in the West End

for pleasure or taking a meal in an industrial canteen, the fact remains that food is always regarded as a necessity. Increases of menu prices are usually greeted with sceptical suspicion, and any impulsive attempt to raise prices is seldom advisable.

Catering trade practice, as most caterers know, is to deal with the matter of costing on broad lines. As we have seen, the probable turnover is known, the probable overhead is known, and it is a simple matter to decide what relation the costs of materials must bear to these factors if the business is to proceed in a state of healthy development; paying its way, not overcharging its patrons and, where necessary, producing a fair profit.

The Percentage System

And so the almost universal percentage system is brought into operation. The management usually lay down a percentage to which the kitchen is expected to work. The percentage will vary according to the type of establishment, its level of menu charges and its standard of service and amenities; in other words—since the overhead of some establishments is higher, in proportion to turnover, than others, the percentage of gross profit in different establishments must vary. The gross profit earned is expressed as a percentage of the establishment's turnover, thus:

Cost of foodstuffs for one week ...	£400
Turnover on foodstuffs for one week ...	£800

In this case the gross profit is 100 per cent. on cost, because out of £800 turnover, £400 is earmarked for foodstuffs used, and the remaining £400, from which the cost of overhead must be met, is equal to the cost.

In the course of business it is safe to say that very many kinds of foodstuffs are bought and resold. These would include various kinds of fish, meat, poultry, game, vegetables, groceries and provisions, besides milk and bread and hundreds of kinds of sundries. Certain individual items such as meat, for instance, would account for a considerable proportion of the total cost of foodstuffs. Dozens of others, if taken singly, would account for only a very small fraction, but in the aggregate their effect on costs is considerable. In costing, therefore, care must be taken that no item in any dish is omitted from the calculation.

What might be termed the ordinary adjuncts of a meal—vegetables, potatoes, tea, coffee, bread and butter—are usually served at prices which yield a higher gross profit than those for the higher priced dishes.

The overhead expenses in any catering establishment are incurred in the interests of its customers. When a person dines in a restaurant he sets out to buy service just as much as he sets out to buy food. The expenses of this service, if worked out at so much a meal, account for the difference between the cost of having food at home and the cost of having it cooked and served by professional caterers. Now, just as each meal costs so much to cook and serve, so does the preparation of each course incur a proportion of these charges; and, of course, every item included in it involves some cost for preparation, cooking and service. With certain items the cost of preparation and service is disproportionate to the cost of materials.

Another factor to be considered in costing dishes is the matter of staff meals.

In some establishments a fixed allowance per head of staff is credited to the kitchen when the gross profit is worked out. In others, however, the food used for this purpose is charged against the kitchen without any bookkeeping adjustment. In either case, costing operations must take into account all food supplied to the staff.

Economy in Buying

Economical buying is a major problem. Storage accommodation is frequently limited, and it is often better where this is the case, to buy perishables daily, and other goods on a weekly purchase. In many cases local buying has been found to create goodwill and confidence amongst employees who know the reputation of the suppliers.

As good buying is essential to steady profits, it is advisable for all caterers to understand this department of their business thoroughly and not leave the market ing to be controlled by either chefs or assistants. The following are primary points that they should be conversant with:

(*a*) Quantity per head and for numbers, in terms of raw material.
(*b*) Food in season.
(*c*) How to choose the various classes of foodstuffs.
(*d*) How to store and preserve food.
(*e*) What goods to purchase in standardised weights.
(*f*) Contract buying.
(*g*) Current market prices and seasonal buying.
(*h*) How to cost.

The problem is no longer whether the works should have refreshments, but how we can get it to them—efficiently, quickly and cheaply. The Government—fully alive to the need for catering facilities—or to the lack of them—has created a special Welfare Department of the Ministry of Labour under the Emergency Powers Act (Statutory Rules and Orders, 1940), No. 1943. Do not let it be thought that the canteen need be a liability even in terms of strict accountancy. Quite apart from its value as an asset in stimulating production, the well-run canteen is not only self-supporting but is in a position to pay back capital investment, if wished, or alternatively the profits can be diverted into still more welfare work in the factory.

The canteen is no passing fad of a Minister, and no temporary bribe to labour. It has come to stay, and the ground gained will not be yielded. Canteens are a part of a great forward sweep to restore the human factor to its true position as *the* factor in industrial production. Canteens are as essential to industry as the machine itself in an age of machinery.

A great deal of waste can go on in a quiet way unless the canteen manager is conversant not only with the buying, but with every branch of his department. He should study and understand the portions of the carcass of meat, which parts are the best to use, and the various commodities that he sells. There is often wastage in getting meat ready, especially in boning, and tons of potatoes and root vegetables are thrown away in careless preparation. The outer leaves of the cabbage, which contain the greatest vitamin contents, frequently go into the pig bucket. Broadly speaking, wisely planned menus and a strict watch on stores will keep costs down and morale up.

With acknowledgments to the "Mechanical World."

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, October 1, page 362.

No.	Date. 1944.	PRICE FIXATION ORDERS
855	July 19.	Dredge Corn (Control and Prices) (Northern Ireland) Order. Revokes S.R. & O. 1943 No. 1020.
856	,, 19.	Oats (Control and Prices) (Northern Ireland) Order. Revokes S.R. & O. 1943 No. 1019.
857	,, 19.	Rye (Control and Prices) (Northern Ireland) Order. Revokes S.R. & O. 1943 No. 1018.
858	,, 19.	Wheat (Control and Prices (Northern Ireland) Order. Revokes S.R. & O. 1943 No. 1017.
874	,, 25.	Order amending the Eggs (Control and Prices) (Great Britain) Order, 1944.
875	,, 25.	Order amending the Fish (Maximum Prices) Order, 1944.
888	,, 29.	Order amending the Meat Products, Canned Soup, and Canned Meat (Control and Maximum Prices) Order, 1944.
892	,, 31.	Home-Grown Apples (Maximum Prices) Order.
904	Aug. 1.	Order, amending the Home-Grown Tomatoes (Control and Maximum Prices) Order, 1944.
972	,, 16.	Rabbits and Hares (Control and Maximum Prices Order. Revokes S.R. & O. 1941 Nos. 1441, 1442, 1908, 1953 and 2006; and 1942 No. 21.
973	,, 16.	Order, amending the Poultry (Control and Maximum Prices) Order, 1943.
1002	,, 22.	Order amending the Green Onion (Maximum Prices) Order, 1943, and the Home-Grown Onions (Maximum Prices) Order, 1944.
1020	,, 28.	Order amending the Cereal Breakfast Foods (Control and Maximum Prices) Order, 1943.
1021	,, 28.	Carrots (1944 Crop) (No. 2). Revokes S.R. & O. 1944 No. 653.
1078	Sept. 16.	Root Vegetables (Maximum Prices) Order. Revokes S.R. & O. 1943 Nos. 1568 and 1682.
1085	,, 18.	Order amending the Home-Grown Onions (Maximum Prices) Order, 1944.
1091	,, 21.	Order amending the oats (Control and Prices) (Great Britain) Order 1944.
		FISH
883	July 28.	General Licence under the Fish (Supplies to Catering Establishments) Order, 1943.

No.	Date. 1944.	FRUIT PULP
798	July 12.	Fruit Pulp Order. Revokes S.R. & O. 1943 No. 1125.
		LABELLING
738	June 29.	The Labelling of Food Order. (1943 No. 1553. Reg. 2.)
		PICKLES AND SAUCES
865	June 20.	Pickles and Sauces Order. Revokes S.R. & O. 1942 No. 594, 949 and 1675; and 1943 No. 37.
		POINTS RATIONING
848	July 18.	Order.
849	,, 18.	Personal Points Order.
969	Aug. 15.	Order amending the Food (Points Rationing) Order, 1944.
		PRESERVES
*841	July 17.	Preserves Order. Revokes S.R. & O. 1941 Nos. 591 and 1639; 1942 Nos. 87, 195, 581, 1075 and 2482; 1943 No. 369 and 1254; and 1944 No. 300.
*842	,, 17.	Food Standards (Preserves) Order.
		* *Printed together as one document.*
		RATIONING
843	July 18.	General Provisions Order. Revokes S.R. & O. 1943 Nos. 1001, 1002, 1003, 1004, 1007, 1327, 1482, 1573, 1597 and 1690; and 1944 Nos. 8, 115, 202, 273, 362, 363, 412, 455-496, 669 and 706.
844	,, 18.	Bacon Order.
845	,, 18.	Fats, Cheese and Tea Order.
846	,, 18.	Meat Order.
847	(No. 2)	Sugar and Preserves Order.
968	Aug. 15.	(No. 3) Order. Revokes S.R. & O. 1944 No. 847.
		SPICES
977	Aug. 17.	Order revoking the Spices (Control) Order, 1943. Revokes S.R. & O. 1943 No. 1265.
		VEGETABLES
870	July 24.	Potatoes (1944) Crop) (No. 1) Order. Revokes S.R. & O. 1944 No. 469, 651 & 699.

Wheat Grading

ERRATUM AND AMPLIFICATION OF DEFINITION

IN FOOD MANUFACTURE, May, 1944, issue the definition given was that adopted by the New York Produce Exchange Grain Inspection Department. This has since been amplified by the U.S. Department of Agriculture and published in the *Handbook of Official Grain Standards of the United States* (Washington, 1943).

The revised definition reads :

Wheat

"Wheat shall be any grain which, before the removal of dockage, consists of 50 per cent. of other grains for which standards have been established under the provisions of the United States Grain Standards Act, and which, after the removal of dockage, contains not more than 50 per cent. of broken kernels of grain of any size. The term wheat in these standards shall not include emmer, spelt, einkorn, Polish wheat and poulard wheat."

Classification

The classification has also been somewhat modified and the present classification is as follows :

"*Classes.* Wheat shall be divided into seven classes, as follows : Class I, Hard Red Spring Wheat ; Class II, Durum Wheat ; Class III, Red Durum Wheat ; Class IV, Hard Red Winter Wheat ; Class V, Soft Red Winter Wheat ; Class VI, White Wheat ; and Class VII, Mixed Wheat."

"*Grades.* Wheat shall be graded and designated according to the respective grade requirements of the numerical grades and sample grade of its appropriate class or subclass, and according to the special grades when applicable.

Hard Red Spring Wheat (Class I)

This class shall include all varieties of Hard Red Spring Wheat, and may include not more than 10 per cent. of wheats of other classes. This class shall be divided into three subclasses, as follows :

Subclass A—Dark Northern Spring

This subclass shall include wheat of the class Hard Red Spring Wheat consisting of 75 per cent. or more of dark, hard, and vitreous kernels. This subclass shall not include more than 10 per cent. of wheat of the variety Humpback.

Subclass B—Northern Spring

This subclass shall include wheat of the class Hard Red Spring Wheat consisting of more than 25 per cent. but less than 75 per cent. of dark, hard and vitreous kernels. This subclass shall not include more than 10 per cent. of the variety Humpback.

Subclass C—Red Spring

This subclass shall include wheat of the class Hard Red Spring Wheat consisting of not more than 25 per cent. of dark, hard and vitreous kernels. This subclass shall also include wheat of the class Hard Red Spring Wheat consisting of more than 10 per cent. of the variety Humpback."

Those interested in this matter should be warned that changes are made periodically in the U.S.A. classification, and for any further and future information they should apply to the Director, Food Distribution Administration, Washington, D.C.

War-time Food Supplies

In a comprehensive study of the food situation throughout the world published recently by the League of Nations* the food rationing in effect in the various countries, the conditions of health and mortality existing among the civilian populations and the supplies of food available at the end of the fourth year of war are fully described.

Clearly written and fully illustrated by diagrams and tables, the survey shows that reductions in food supply fall most heavily on the working population in industrial centres who have no means of supplementing the basic rations, but in Britain where there are extra schemes such as communal feeding and price control, together with the unlimited supplies of bread and potatoes, the average intake of calories is even now at pre-war level.

In countries where bread and potatoes and cereals are not so plentiful, such as Germany and occupied Europe and the U.S.S.R., the rationing system is much more complicated. In Russia, consumers are divided into four main categories : manual workers, office workers, adult dependents and children under 13. In Germany a light worker's rations contain 2,285 Calories a day, a heavy worker's 2,685, and a very heavy worker's 3,435 Calories. It has been estimated that a shoemaker uses 2,000-2,400 Calories a day, a weaver 2,400-2,700, a carpenter or a mason 2,700-3,200, a farm labourer 3,200-4,100 and a lumberman 5,000 and over. Women on an average require fewer Calories than men ; but here again it depends on the activity of the woman. A seamstress may require only 1,800-2,100 Calories a day, while a woman engaged in housework may require 2,300-2,900 Calories. Age also must be taken into account when assessing the number of Calories required ; an adolescent boy may consume 3,500 Calories in a day, while a person over 70 would need only a small fraction of that amount.

Great Britain, thanks to increased mechanisation and intensive cultivation of an increased acreage under tillage, can now supply two-thirds of her own current food consumption. Similarly in the U.S.S.R. considerable areas of previously uncultivated land have been brought under cultivation and, as a large part of the grain area invaded by the enemy was recovered in time to be sown last autumn, improved supplies are in prospect for 1944-45 consumption.

This survey brings up to date and expands the study on *Wartime Rationing and Consumption*, which was published by the League in 1942, and gives as clear a picture as it is possible to obtain of the food situation in the occupied as well as the free countries of the world.

* *Food Rationing and Supply 1943/44*. By the League of Nations. London. 4s. 6d. net.

Trade News

Adhesives in Warfare

In a booklet issued by National Starch Products, Ltd., are reproduced the first of a series of posters in colour prepared for display at their four domestic plants. These dramatise some of the essential end-uses of the products in modern global warfare.

Code numbers, familiar to the staff, have been used to identify the materials manufactured for the purposes described, and should greatly enhance the interest of the posters to the workers.

Apart from edible cornstarch, starch products seldom reach the fighting fronts in any self-evident form. They are essential to the processes of many war industries, but usually lose their identification in the finished products.

The booklet gives a number of little-known facts about the use of starch in war work. We are indebted to National Adhesives, Ltd., for a copy.

* * *

Wrapping Materials

Entirely independent of large combines and yet working in close co-operation with many of them in the production of their speciality wraps, Arthur Woollacott, Ltd., have steadily built up a reputation as specialists for the supply of wrappers for the many products classified under "Food Manufacture."

They have a large fund of war experience to draw upon for the benefit of their friends when peace conditions once more allow them to go about their normal business.

Woollacott s have noted the definite trend towards heat-sealing for peace-time packs, and, as far as labour and materials will permit, their Technical Development Department is in the position to give advice now on any packaging problem.

Their specialities include laminated aluminium foil and treated papers, viscose and other heat-sealing moisture - vapour - proof film and papers, glassine, greaseproof, vegetable parchment, all in coils, cut pieces and punched shapes, and also paper shavings.

Albert E. Evans & Co. Ltd.

Albert E. Evans and Co., Ltd., have purchased from L. A. Britton and Sons, Ltd., their factory at 180, Hewitt Road, Harringay.

* * *

Aluminium for Canning

Aluminium has been successfully used as a material for the manufacture of cans since 1929. It was originally developed by the Norwegian fish-canning industry, but its use has been extended to cover a wide range of foodstuffs, including some hitherto canned in tinplate. Pure aluminium is mostly used, advantage being taken of its very good resistance to corrosion, although the 1¼ per cent. manganese alloy, having a greater strength and almost equally good resistance to corrosion, enables a lighter section to be employed with consequent saving in weight and materials.

With experience, cans may easily be fabricated from aluminium by spinning, deep-pressing, and impact extrusion. It is particularly suitable because of its ductility and uniform metallurgical qualities. These cans may be produced in any required shape, and possess striking characteristics. They are light; they have a pleasant bright appearance which deteriorates only slightly even under severe conditions; they are homogeneous and do not therefore suffer local corrosion due to scratching; they are available in a variety of finishes—plain, embossed, varnished, enamelled, and lithographed; and they are resistant to food products.

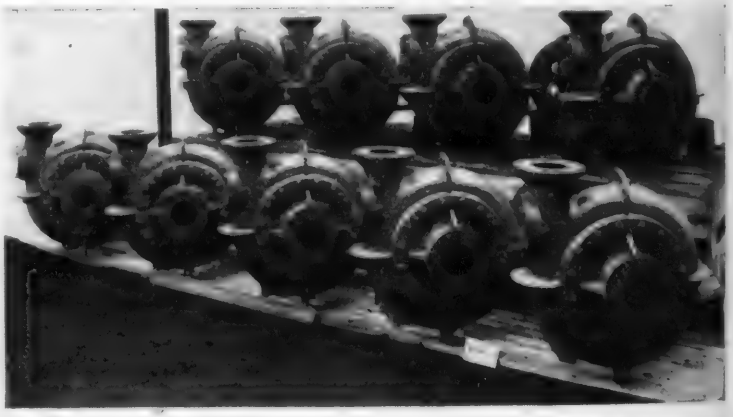
Unprotected aluminium can be used for many neutral foodstuffs, including various types of fish, vegetables, and fats. Anodised or chemically oxidised aluminium can be employed for all foodstuffs, including meats, fruits, soups, etc., but not for strongly acid substances such as some fruits and vinegar; for these, anodised and lacquered aluminium proves satisfactory.

* * *

Pumps in Potato Dehydration Factories

The illustration shows nine out of the twelve "Pulsometer" Fullway pumps and four end-suction centrifugal pumps sent to four Government potato dehydration factories, one of which was described in FOOD MANUFACTURE, July, 1944.

Twelve Fullway pumps were installed in four batteries of three pumps—one battery at each of the four factories working under different heads. Two out of the three pumps in each battery are used for constant work. One of these is assigned for use in connection with flumes and the other for settling-tank duties. The four end-suction centrifugal pumps are the firm's LE type.



Threshold Treatment

This is a process whereby water is treated with low (threshold) concentrations of Calgon (sodium hexametaphosphate), the amount required being usually of the order of two pounds per million pounds (100,000 gallons) of water.

A booklet issued by Keith Piercy, Ltd., gives details of the applications for sodium hexametaphosphate in water treatment, including the prevention of formation of calcium carbonate scale in condensers, the cooling systems of oil engines and other internal-combustion engines, calorifiers and hot-water systems. It also describes its use in preventing trouble due to after-precipitation, which frequently occurs in water mains and filters following treatment in a lime-soda softener.

The various treatments described in the booklet, which is intended mainly for works engineers and chemists, are being used successfully in many public undertakings and industrial plants.

* * *

Chadwick Public Lectures

The first lecture in the autumn programme of the thirty-second annual series of Chadwick Public Lectures was delivered on October 3 at the Royal Society of Tropical Medicine and Hygiene, when the Right Hon. Lord Amulree, M.D., B.Ch., M.R.C.P., M.R.C.S., lectured on "Water Supplies in Peace and War."

Sir William J. Collins, K.C.V.O., M.D., M.S., B.Sc., F.R.C.S., Chairman of the Chadwick Trustees, presided.

The Malcolm Morris Memorial Lecture will be given on November 28 at 2.30 p.m. by Dr. J. A. H. Brincker at the Sir Edward Meyerstein Lecture Theatre, Westminster Hospital Medical School, his subject being "Research in all its Various Aspects Essential for the Promotion of Health and the Prevention of Disease."

On December 12 at 2.30 p.m. at the Royal Society of Tropical Medicine and Hygiene, Mr. George H. Walker, City Analyst, Salford, Lancs, will read a paper on "Food and its Adulteration during the Present War."

Admission to all the Chadwick Lectures is free and tickets are not required.

Death of a Pioneer

Mr. James Mortlock, a pioneer of the sterilised-milk trade in this country and one of the first to introduce carton milk containers, died recently at the age of sixty-eight. He built up a large milk business in the East End of London.

* * *

Full-Lift Safety Valves for Steam Boilers

The development of the boiler safety valve, from the simple but crude weight-loaded designs of 100 years ago to the modern spring-loaded equipment designed for high-duty boilers, is strikingly illustrated by the records of Hopkinsons, Ltd., who recently celebrated their centenary as manufacturers (from 1843) of boiler mountings and accessories.

The firm's designs of this valve fall into three general types: (1) the ordinary spring-loaded safety valves, (2) the "Hydis" high-lift safety valves for high-capacity boilers up to 250 lbs. per sq. in., and (3) the "Hylif" full-lift safety valve with maximum discharge capacity, suitable for the modern high-duty water tube boiler.

At the present time about seventy steam generation plants operating at pressures of 600 lbs. per sq. in. and over, including in some cases 2,000 lbs. per sq. in., are using "Hylif" valves, which can be regarded as standard practice for the majority of high-pressure boiler installations in Great Britain, both in power station and industrial establishments, whilst they are used extensively in many other countries.

Essentially the principle is that when the steam pressure rises to the set pressure the valve discharges against the heavy spring with a small lift, on the principle of an ordinary type safety valve. This initial opening allows the escaping steam to exert its pressure over the full area of the valve face, and increases the lift until the face enters the valve guide, when the steam is deflected downwards by the edge of the latter, and the consequent reaction pressure lifts the valve to its full open position. At this final stage of lift the discharge area between the seat and the valve equals the net area through the seat throat, and the discharge capacity has reached its maximum. When the discharge pressure has been relieved the valve begins to close, and as it emerges from the valve guide the reaction pressure ceases and the valve shuts down sharply.

Because of the high duty thereby given, one of the main advantages is that the number of safety valves required on a boiler is reduced, and it may be stated also that the maximum lift and discharge capacity are obtained at an accumulation of not more than 2 per cent. of the set pressure.

There are five standard types of valve, intended respectively for a maximum pressure of 250, 350, 600, 700 and 900 lbs. per sq. in., and in addition special valves are supplied for any pressure, one set, for example, operating in a well-known British power station being for 2,120 lbs. per sq. in.

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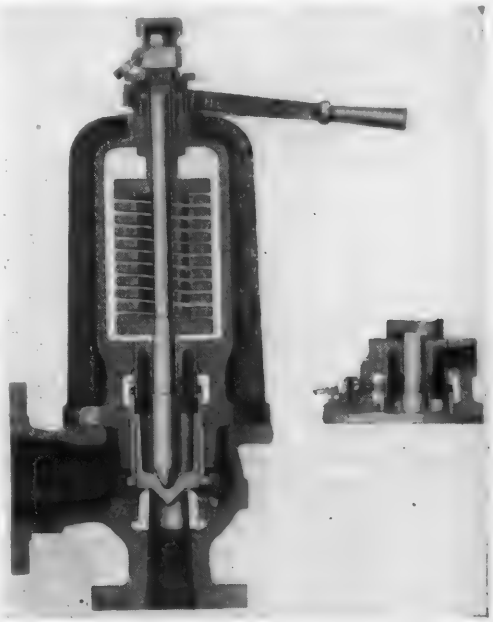

Grocers and Ministry of Food

The National Federation of Grocers and Provision Dealers' Associations, in a statement on post-war policy, considers that there should continue to be a Ministry of Food, and that if it is found necessary to end its ministerial existence it should become a separate department of the Board of Trade.

During the post-armistice period of control straight rationing should be continued, and expanding supplies of points foods should be met by increasing consumers' points purchasing entitlement rather than by "down-pointing" the foods affected. With increasing quantities of certain foods like sausages and cakes there should be improvement in quality. "Monopolistic" wartime associations and companies should be liquidated as soon as possible, and maximum price orders should continue until supplies exceed demand.

The federation attacks the "octopus chain stores" of both the multiple firms and the co-operative societies. These, it claims, "are engaged in buying up old-established independent businesses, and, in the former case, often running them under their own names. Thus they sidestep registration and licensing of retail businesses. Unless a halt is called to this extension of big business, consumers will find themselves with no shopping choice outside the tentacles of the chain store octopus or the co-operative octopus.

"In the United States much effective protection of independent traders has been given by way of State and Federal Legislation. Some such protection must be given in this country, unless the simpler method is adopted of fixing an upper limit to the number of shops which can be held by one company or associated group of companies."

* * *

Royal Institute of Chemistry

The Annual General Meeting of the London and South-Eastern Counties Section of the Royal Institute of Chemistry of Great Britain and Ireland will be held on November 22 at 30, Russell Square, London, W.C. 1, at 4 p.m.

DAVID WILKERSON

A Tribute

Wing-Commander David Wilkerson, D.S.O., D.F.C., has been killed in a flying accident. For the nation and the R.A.F. his death is just another of thousands of grievous losses, of brilliant careers tragically ended. To his colleagues his loss is more personal, and it is difficult to pay his memory any tribute that would be adequate.

He joined the staff of Leonard Hill Limited when he was about seventeen and worked his way through most departments, not despising the traditional stamp-

licking and the operation of the telephone switchboard, to get a thorough knowledge of technical journal publishing. He brought to every job an integrity, a capacity for industry, and a profound seriousness of mind which assured that he would master it. Just before volunteering for the Air Force he was assistant advertisement manager of our contemporary, *Manufacturing Chemist*, and was beginning to make a wider circle of friends throughout the chemical industries.

He served in the ranks before being commissioned in 1941, and thereafter his promotion was very rapid, even in a force which is quick to reward skill and gallantry. He survived two tours of operational duties — forty-six operational flights in all. He earned his D.F.C. during his first tour. When the D.S.O. was conferred on him last May the citation referred to his "high powers of leadership, great skill and determination." It continued: "He is a devoted and zealous squadron commander, whose great drive and tactical ability have contributed in a large measure to the high standard of operational efficiency of the squadron." Behind these official phrases his friends guessed, from casual and infrequent references to his three raids on Berlin and many over the Ruhr, that there lay a record of enormous competence and daring held in check by a shrewd sense of responsibility. We knew, for example, that under his training his squadron came to be known as the "Aiming Point Squadron" for its record of extreme accuracy in bombing.

At the age of twenty-six Wilkerson was an acting wing-commander, commanding a Halifax squadron, while at the same time forming another squadron, which he took over in November of last year, quickly making it one of the best in its group. He was only twenty-seven when he was killed —one of the youngest wing-commanders in Bomber Command.

Mr. W. L. Hill, chairman of Leonard Hill Limited, offers the following tribute to his memory:

"Throughout his service with the R.A.F., David Wilkerson maintained his contact with the Leonard Hill organisation and he had an important place in its programme of development. Only a few weeks before his death he spent some days with me and entered actively and enthusiastically into discussion of the plans the realisation of which we had hoped would not be long postponed. No one, I suppose, is cast in a perfect mould, and David presumably had his faults, but I never discovered them. With all his efficiency, and the undoubted capacity and gallantry to which his rapid promotion and decorations testify, he was the personification of courtesy and gentleness. By his death his colleagues and I have lost an irreplaceable collaborator and a dear friend."

AIR CONDITIONING IN CANNING FACTORY

Mr. W. V. Smedley

A new air-conditioning plant, which will provide a completely steam-free atmosphere for the workers, has been installed by Wisbech Produce Canners, Ltd., at their Lynn Road factory, Wisbech.

The plant, believed to be the only one in this district, has been put in by the Sturtevant Engineering Company at a cost of several thousand pounds. The work was commenced about six months ago and is now almost finished.

The managing director, Mr. W. V. Smedley, had been trying to acquire a plant of this kind for the past three years, as such an installation could not fail to be of considerable benefit to the workers in the main canning factory and in the jam room. The plant, the operation of which requires 24 h.p., aims at establishing an even temperature in the factory and extracting the steam which the various processes send off.

The picture below shows the intake of fresh air through the roof, the radiator through which the air is circulated, and the trunking round the retort ring where the cans are sterilised. The retort room atmosphere is kept clear by hot air blowing in from all sides to the perimeter of the ring. This equipment clears the atmosphere of steam and maintains a constant temperature independent of atmospheric conditions.

The steam is extracted by electric fans, which are installed above the plant where cooking and processing is carried on, and is expelled through the roof of the factory; these fans, of which there are twelve, extract 22,000 cubic feet of steam and air per minute. That is half the installation—the other half of it "conditions" the air as it enters the factory. Air is drawn from the outside by a very large fan and circulated at the

Here are shown the large trunking lines covering the entire width of that part of the factory where most of the women work—away from the main cooking and production lines. The circulation of hot or cold air, according to the season of the year, provides conditions of comfort at all times.

rate of 30,000 cubic feet per minute; this air is warmed over a series of radiators and then evenly distributed throughout the entire factory by an extensive system of pipes.

The temperature and humidity of the air may be varied according to requirements, thus enabling the large number of employees to work under healthful and pleasant conditions.

* * *

Controlled Flexible Bearings

We have received the latest copy of the Harrisflex Bearings Brochure, which contains a description of the rubber bearings manufactured by Harrisflex Bearings, Ltd.

The applications of this bearing are described and a full illustrated list of types and dimensions is included. The brochure is available to any concern interested in receiving a copy.

* * *

Appointment of New Directors

Messrs. J. L. Carlisle and C. J. Grayson, who have had many years' service with George Scott and Son (London), Ltd., and Ernest Scott and Co., Ltd., have recently been appointed directors.

These companies are associated with the old-established firm of Henry Balfour and Co. of Leven, Fife, the managing director of which company assumes the managing directorship of these two concerns.

Associated with Henry Balfour and Co., Ltd., and the Scott Companies is Enamelled Metal Products Corporation (1933), Ltd., who are, together with their American associates, the world's most renowned manufacturers of "Pfaudler" glass-lined equipment.

* * *

Oil from "Subterranean" Clover

The fixed oil of seeds of the so-called "subterranean" clover (*Trifolium subterraneum*), which is a valuable and extensively grown pasture plant in Australia, has had its constants examined. The oil is stated to be similar in character to olive, maize, and cottonseed oil. No vitamin A could be detected in the unsaponifiable matter.

OBITER DICTA

● Fishermen, curers and fishmongers are seeking an answer to the riddle of the kipper—should it or should it not be dyed?—*Evening Standard.*

● Our basic concern in planning for agriculture in the years after the war must be with people, not trade balances or price levels.—*Mr. Claude R. Wickard, U.S. Secretary of Agriculture.*

● Potato picking is hard work, the weather is less reliable, romance is scarcer. It is not quite in the "blood, sweat and tears" class, but it *is* tough.—*Mr. Donald McCullough.*

● This autumn we are anxious to see that many more young people get their daily cup of "Namco," which contains first-class protein and many other valuable nutrients.—*Minister of Food.*

● We are not suggesting that there is any formal resemblance between Macbeth and a dehydrated potato, except that dehydration associated with a potato suggests a note of classic dignity, of austere severity.—*The Scotsman.*

● "Meals" of lentil soup and rice pudding are still being served in some areas, and if the expenditure on foodstuffs is thoughtlessly restricted this type of "refreshment" will doubtless continue to be supplied.—*James Grigor in a letter to "The Times."*

● If we eat more calories than we need, we get fat. For example, if a man walked for an hour to use up 200 calories and then drank a pint of beer, he might as well have stayed at home, because the pint of beer provided him with 200 calories.—*Dr. Magnus Pyke, Ministry of Food.*

● Had the phenomenon of a dead elephant wallowing in the North Sea been observed but a few days earlier when the eloquent M.P. for East Aberdeenshire was visiting the herring fishing grounds, what a tale would have been his for the delectation of Parliament! It would, we imagine, have quite dwarfed his graphic story of the smells which so violently assailed him at Aberdeen Fish Market on a summer day.—*Aberdeen Press and Journal.*

Danish Bacon Company

Mr. Frank Herbert (chairman) presided at the annual general meeting of the Danish Bacon Co., Ltd., held in London recently. The following is an abstract of his remarks:

"The main objective of the company during the war years has been to provide and maintain an unbroken continuity of distribution throughout the areas served by its distributive depots, and during the five years of war distribution over the entire country has been maintained without a single break, despite the inevitable disturbances due to war and in particular to enemy action. However, we have been able to carry out our distributive function on schedule.

"The restrictions inseparable from a war-time economy have necessarily limited our scope for enterprise, but we may perhaps now permit ourselves to look forward to a not too distant time when enterprise will again be freed."

Commenting on the shape the distributive food trade would take in the future, he said it would be premature to crystallise ideas on post-war planning, as it must be conditioned on national and international policy. What seems clear, however, is that currency control and the quantitative control of imports must continue, and that distribution during the period of reconstruction must be conducted within the framework of those major influences.

Meantime the immediate problems of supply and distribution in liberated Europe have to be faced, problems that will not have been completely solved until world food production has brought back times of plenty.

If the pre-war conception of demand is modified in the direction of physiological need, an extension of the nutritional planning begun during the war might be translated into a long-term production programme which would help to create confidence for the food producing and exporting nations, and this in turn would provide great opportunities of service for the food manufacturing and distributive trades.

Denmark, for so long the main source of supplies, has for over four years been occupied by the enemy, and there is confident

hope and belief that we shall very soon see her free again.

Concerning the accounts, with a distribution of 5 per cent. on the ordinary shares and 5 per cent. on the preference—some £20,000 gross — provision for taxation stands at £69,080.

The net trading profit for the year was £185,294, to which is added the amount brought forward of £2,684, making a total available of £187,978. From this sum, besides the dividends already mentioned, we have made the provision for taxation of £69,080. It is also proposed to transfer £12,360 to staff pension fund, £11,768 to preference share redemption fund. The reserve for bad and doubtful debts absorbs an additional £5,000; reserves have also been made for contingencies (£10,000), for deferred repairs (£10,000) and general reserve (£4,000). There is thus a balance to be carried forward of £3,399.

The directors' report and statement of accounts for the year ended December 31, 1943, were adopted.

* * *

Ovaltine Research Laboratories

The Annual Report of the Ovaltine Research Laboratories for 1943 has been received. Its delay is due to war conditions.

The laboratories were originally established to control the manufacture of Ovaltine and certain pharmaceutical products, and were subsequently extended to undertake general research work in nutrition.

The following brief notes will serve to indicate the type of work in progress:

In connection with adsorbents which will separate vitamins and other important food constituents, it has been found possible to produce one equal in selectivity to the finest pre-war German product.

A method of estimating carotene and other pigments has been developed. This method has been used to determine the carotene (pro-vitamin A) and lycopene in twenty-six distinct species and hybrids of rose hips.

The findings of the experiments described in the previous report showing that concentrated extracts of selected rose hips contain very high concentrations of vitamin P, several times that of purified hesperidin, a glycoside occurring in oranges and thought to be closely related to the actual vitamin have been since confirmed. Tablets under the trade name of Hipexa are now available.

For several years past a study has been in progress of methods of estimating vitamin C. The possibility was explored of estimating true vitamin C by condensation with formaldehyde as proposed by Lugg. Modifications of Lugg's method were eventually devised by Mapson in Cambridge and in the Ovaltine laboratories and applied to a wide range of foodstuffs.

Other matters investigated were:

Changes in walnuts during ripening; losses of vitamin C during storage; food value of malt extract; changes in vitamin content during malting; vitamin B_2 estimations.

* * *

Production Control in the Small Factory

This booklet is the second of three dealing with Production Control and, as its title indicates, is designed to advise on production control technique in the small factory, with the overriding object of stressing the need for control if production is to be economically increased and waste of time and effort eliminated.

The booklet may be found of greatest use in the factory employing 50 to 200 people, but it is recognised that for production control purposes a factory employing 200 people may be simpler than one employing fifty if the type of product in the former is less complex than in the latter.

The text of the booklet epitomises recommendations for the simple control of the issue of quotations, of purchasing, of the flow and volume of work, of production instructions, of time-keeping and of costs; and is illustrated with specimen schedules, cards, record sheets and a comprehensive order flow chart which shows the various stages through which an order will pass.

Copies of the booklet B.S. 1,100, Pt. 2, 1944, can be obtained from Publications Department, British Standards Institution, 28, Victoria Street, London, S.W. 1.

Changes of Address

The American Standards Association, Grand Central Terminal Office Building, 70, East 45th Street, New York 17, N.Y.

Allardyce Palmer, Ltd., Kingsway Corner Buildings, London, W.C. 2.

Alexander and Company, Ltd., Progress Works, Hempshaw Brook, Stockport.

Due to increased business, Tank Linings, Ltd., have moved to 14, Foregate Street, Worcester. Telephone: Worcester 5009. Telegrams: Tanks, Worcester. Their factory will remain at Church Lane, Martley, for the time being.

The new address of the Technical and General Advertising Agency, Ltd., is 24-25, New Bond Street, London, W. 1. Telephone: Mayfair 4074. Telegrams: Miracle, Wesdo, London.

The present address of Messrs. Beach Bros. (Dover), Ltd., is: Western Road, St. Thomas, Exeter.

* * *

Alderman Richard Irvin

Alderman Richard Irvin, J.P., who is chairman of Tyne Brand Products, Ltd.—the well-known canning company of North Shields—was by unanimous vote admitted as Honorary Freeman of his native borough.

This richly deserved honour will, in particular, please his many friends throughout the food trade.

* * *

New Barley Variety

A new two-row barley with narrow ears, named "Pioneer," has recently been introduced by the National Institute of Agricultural Botany, Cambridge. It has been derived from a cross between Tschermak's winter barley and Spratt-Archer, and has a high degree of winter hardiness. Its straw is rather short and it ripens early. Though not yet grown on a large scale, it appears to be best adapted for soils of average fertility. It is recommended to growers who require an early ripening winter barley capable of producing grain of good malting quality.

Overseas Items

Wine—British Type

Sir Douglas McCraith, chairman of the Price Regulation Committee, North Midland Region, warns the public against certain unbranded concoctions described as "Wine—British Type."

A retail trader bought a considerable quantity of "Fine British Golden Sherry" and "Burgundy Type." The report of an analyst who examined samples is: "Both liquids are somewhat inferior grade domestic wines prepared from sugar and vinegar. The 'Burgundy' is flavoured with raspberry juice, and would commonly be described as raspberry vinegar. There is no alcohol in either sample."

The price charged for the "Sherry" by the wholesaler was 18s. 9d. a bottle, and the retailer's price based upon that figure would probably be about 25s. a bottle. The "Burgundy" was priced at 10s. 6d. a bottle wholesale.

As there is no limitation to the price which may be demanded for liquors, retailers and the public are warned against purchasing "type" wines of unknown make without investigation.

* * *

Rubber Sealing Rings

The British Standards Institution has published a War Emergency British Standards Specification for rubber sealing rings for domestic preserving jars for fruits and vegetables. This has been prepared mainly by the Technical Committee of the Federation of British Rubber and Allied Manufacturers' Associations in conjunction with the Research Association of the British Rubber Manufacturers, at the request of the Ministry of Food, in view of the vital importance of the preservation of home-produced fruit and vegetables as part of the national war effort.

The Specification has been adapted to the requirements of the appropriate Rubber Control specification.

It is recognised that the production of satisfactory rubber components for use in direct contact with foodstuffs demands specialised experience.

Specification is B.S. 1169-1944, and may be obtained price 2s. net, post free.

Dr. Harvey W. Wiley Centenary

A crusader in the history of agriculture in the United States was Dr. Harvey W. Wiley, whose birthday, 100 years ago, was commemorated at the annual meeting of the American Chemical Society. Dr. Wiley is best known as the father of the American Food and Drugs Act, better known as the pure-food law, passed in 1906 largely as a result of his continuous crusade against impure and adulterated foods and drugs.

An outstanding agricultural chemist of his day, Dr. Wiley also did many other important things. He established zones in which sugar beets could be successfully grown in the U.S., and did so much for that industry that some historians speak of him as its founder. His work on the sugar sorghums was also of great importance. Dr. Wiley also played an important part in organising the association of official agricultural chemists which determines the official methods used in the examination of human foods, livestock feeds, fertilisers, and other products likely to be adulterated. He was the chief of the Department of Agriculture's bureau of chemistry, forerunner of the present Bureau of Agricultural and Industrial Chemistry. The important work of that bureau continues to expand.

* * *

Canadian Dehydration

The dehydration plant at Kentville has been awarded the first Nova Scotia contract for dehydrating spring cabbage, which is believed to be the first time this particular project has been undertaken in Canada. The plant has also signed a new contract with the British Food Ministry for 150,000 barrels of dehydrated potatoes—about the same quantity which was shipped overseas last season to the armed forces overseas.

Alberta's first dehydration plant for the processing of vegetables is now in operation. The new plant in North Lethbridge at the present time is working on turnips.

Plastics from Corn Sugar

One of the most recent discoveries of the Bureau of Agricultural and Industrial Chemistry, U.S.A., announced in September is a method by which itaconic acid, a chemical used in the production of plastics, can be produced at a cost of approximately 50 cents a pound. Present prices run as high as 10 dollars a pound.

The method involves the fermentation of corn sugar with a mould, *Aspergillus terreus*. The mould is seeded into the surface of a 20 per cent. sugar solution containing other necessary nutrients. It grows as a thick brown mat on the surface of the solution, which is kept in large shallow pans, and in course of ten or twelve days produces 1 lb. of recoverable itaconic acid for each 4 lbs. of sugar used.

This new process is indicative of some of the important work being done at the Northern Research Laboratory of the present Bureau of Agricultural and Industrial Chemistry. This laboratory has one of the largest collections of important moulds and other micro-organisms to be found anywhere, and a staff of trained scientists who are using them to develop industrial products from agricultural commodities. Penicillin is produced in this manner by one of the moulds from this collection.

* * *

Australia's Poor Wheat Harvest

The wheat harvest is alarmingly low, the fodder position is acute, and Australia is facing the worst drought since 1914, Mr. Scully has told the Australian Agricultural Council.

Although the Australian Wheat Board estimates wheat production at 55 million bushels, Mr. Scully revealed that the States' expectation is only 48 million, and that crop failures may jeopardise the Food Production Programme, particularly meat and dairy products.

Mr. Curtin has announced a £3,000,000 grant to drought-afflicted cereal farmers, 50 per cent. of which will be borne by the States.—*Reuter.*

Swedish Agriculture

The economic situation of Swedish farming has been considerably strengthened by extensive organisation work during the last few decades. It has been reported that the twelve branch organisations of the central organisation, *Sveriges Lantbruksfoerbund*. (Union of the Swedish Farms), had at the end of 1943 as many as 866,568 members. The rapid development is illustrated by the fact that the number of members had been doubled since 1935. The biggest of the branch organisations are the Union of Swedish Dairies with a membership of about 229,000 and the Butchery Organisation, numbering 226,000 members. Other branch organisations are viewing the facilitating of credit conditions. Producers of wood, eggs, sugar-beets, garden products, fur animals, starch, flax and hemp, plants for oil extraction, spirits, etc., have founded special organisations in order to safeguard their common interests. The total turnover in all these branch unions in 1943 amounted to Kr. 1,463 millions, which means an increase by about Kr. 250,000 in comparison with 1942. It is estimated that the turnover in 1943 corresponded to about 90 per cent. of the total amount earned by Swedish farmers by the sale of agricultural products.

A co-operative organisation which is organising common purchases of machinery, fertilisers, etc., required by farmers has also reached a high stage of development. The largest central organisation of this domain, the *Svenska Riksfoerbund*, had in 1943 a turnover with a value of Kr. 151·1 millions.—*Reuter's Trade Service.*

* * *

More Dairy Products from Australia

Mr. T. L. Williams, Secretary for Agriculture in Queensland, said recently that Australia's obligation to supply dairy products to England was greater than ever. He issued a warning that Australia's retention of the British market depended on the extent to which supplies could be kept up in this difficult period. Dairy farmers in Queensland have been asked to step up 1944-45 butter production to 55,000 tons. —*Reuter.*

Fewer Canadian Cheese Exports

Owing to the prolonged hot weather in most parts of Canada this summer there has been a drop in milk production, which means that Canada may not be able to supply the 12,000,000 lbs. of cheese promised to Britain by the end of March, 1945. Dr. G. S. Barton, Chairman of the Dominion Agricultural Food Board, has asked Canadians to avoid all possible wastage or overpurchasing of milk in order to maintain the British cheese ration and to supply the Canadian Forces overseas.

Canadian manufacturers believe that a strict quota may be imposed on processed cheese so that the supply of plain cheese required for overseas may be maintained.

Last year Britain asked for 150,000,000 lbs. of cheese, and Canada supplied 115,000,000 lbs. plus 7,000,000 lbs. of butter.

Government officials cannot predict how much of this year's quota will be met.—*Reuter.*

* * *

Visit of U. S. Food Official

Mr. Douglas C. Thomson, an official of the U.S. War Food Administration, is leaving for London shortly, and will consult with British food authorities on current and future lend-lease operations.

He will also represent the W.F.A. in the mission for economic affairs (a mission representing eleven U.S. Government agencies in Britain) and on various post-war food requirement committees that are concerned with the production and distribution of food. He also will study food management technique employed by the British.—*Reuter.*

* * *

Exportation of Cattle from Argentina

Exports of bovine breeding cattle from Argentina will in future require the permission of the authorities, according to a recent Argentine decree. It is stated that this measure has been taken owing to the extraordinary rise in prices for dairy cattle caused by large exports to foreign countries, where stocks of breeding cattle are depleted as a result of the war.—*Reuter's Trade Service.*

Sunflower Oil in Argentina

Sunflower oil production in Argentina has increased considerably in the course of the last few years. In 1924, the first year in which sunflower was industrially exploited in Argentina, out of 282 tons of seeds 52 tons of oil were produced. Production increased gradually, and in 1934 reached the figure of 46,000 tons. Statistics published by the *Censo Nacional Agropeucuario* for 1937 stated that 176,988 hectares under sunflower produced 99,601 tons of oil. In 1939, the area under sunflower amounted to 500,000 hectares, with a production in 1940 of 375,000 tons.

In 1943-44, Argentina's production of sunflower oil amounted to 1,072,000 tons, and the country occupied the second place among the sunflower oil-producing countries of the world—after the Soviet Union and before Rumania.

In the course of the years 1937-43, plant oil production increased from 319,666 tons to 1,116,979 tons, 60 per cent. of the total being derived from sunflower, followed by flax and cotton.—*Reuter's Trade Service.*

* * *

Experimental Work on Dietetics and Medicine

Studies of experimental leprosy in a search for medicines that might arrest or control the disease have been undertaken at the School of Tropical Medicine, operated under the auspices of Columbia University, at San Juan, Puerto Rico. Other war-time researches under way at the School relate to tropical diseases, botanical drugs, native oils, and diet in Puerto Rico, the annual report of Dr. Morales Otero, the director, discloses.

Mice are being used in the leprosy work. Since leprosy can be given to them in a short time, it appears possible to tell within a month or two whether any drug, glandular secretion, or other medicine will be effective, the report says.

Projects also are being carried out on skin and fungus diseases, on sprue, on a rapid method for classifying strains of dysentery bacilli, and on typhus and Weil's disease, an acute infectious jaundice.

News from the Ministries

Resignation of Mr. Colin Ellis

Mr. Colin Ellis finds it necessary for personal reasons to relinquish his appointment as Director of Home-Grown Cereals in the Ministry of Food on November 30 next. Mr. Ellis has rendered valuable service to the Ministry and his resignation has been accepted with regret.

The Minister has appointed as his successor Mr. L. W. Crawford, who will take over responsibility on December 1 next.

Mr. J. N. M. Scott will remain Deputy Director of the Division.

* * *

Skim Milk Powder: Biscuits and Flour Confectionery Allocation

Supplies of skim milk powder are again available for use in the manufacture of biscuits and flour confectionery. An allocation on the basis of 100 per cent. of datum entitlement has been made for the calendar months September-October, 1944, and further allocations will be made during the winter months.

As in previous allocations, supplies are being released to wholesalers and bakers' sundriesmen for redistribution to their bakery customers and to members of the Cake and Biscuit Manufacturers' War-Time Alliance. Releases will be made by the Milk Powder Pool, Ltd., against permits issued by the Ministry of Food, Allocations Control. Full instructions have been issued to the manufacturers and distributors concerned.

* * *

500 Tons of Rum

The Ministry of Food has given permission to the Rum Importers' Association to import, if satisfactory arrangements can be made, 500 tons of mature rum—equivalent to about 1,200,000 bottles—from Jamaica, Demerara, Trinidad, and the Barbados. Stocks of rum in Britain are very low. "I do not think we have more than about 8 per cent. of our pre-war stocks now," said a Ministry of Food official. "No permission to import rum has been given since 1940."

Amendments to the Flour Order, 1944.

By an Order which came into force on October 1, 1944, two amendments are made to the Flour Order—viz., a decrease in the rate of extraction of national flour from 85 per cent. to 82½ per cent., and an increase of 1s. 9d. per sack of 280 lb. in the price of flour sold by millers, flour importers and flour factors.

The increased price does not apply to sales of semolina or high ratio cake flour produced in the United Kingdom, nor does it affect export or maximum retail prices.

Copies of the Order (S.R. & O. 1944 No. 1088) can be obtained, price 1d., from H.M. Stationery Office at the usual addresses or through any bookseller.

Colonel Llewellin, Minister of Food, in a statement issued today, said:

"The object of the reduction of the extraction rate of flour is to improve our national bread. This is already a first-class loaf, thanks to the co-operation of the millers and the bakers. The present alteration in the extraction rate will reduce the amount of bran—that is, fibre—while retaining the bulk of the wheat germ. This measure will in due course have the result of producing a whiter and better quality loaf with no appreciable loss of nutritional value. The improvement has only now become possible as the result of research and experiment in milling technique and I have been able to adopt it because the ships are now available to import the necessary additional wheat.

The reduction of the extraction rate will result in the production of additional feeding stuffs in the form of millers' by-products. The increased supplies will, like the existing output, be brought to account in the feeding stuffs ration pool, out of which the distribution of rationed animal feeding stuffs is made. In anticipation of these extra supplies certain adjustments in ration issues have already been made and others that may become possible will be announced later.

It would be noticed that the increase of price in the Order applied to transactions by controlled millers and importers and by factors operating under Ministry licences. In these circumstances the extra price would, of course, accrue to the Government and would amount to a reduction of the subsidy on flour paid out of public funds. The increase would not be added to the price of bread because bakers would receive a compensating increase of their bread subsidy."

* * *

Dried Eggs in Flour Confectionery

The Ministry of Food wishes to remind bakers that the nutritional value and general quality of flour confectionery can be improved by using more dried eggs now that larger quantities are available. The Ministry has been advised, following tests using higher proportions of dried eggs, that increased usage is practicable and that the results obtained are extremely satisfactory. It is suggested that the best method of incorporating the additional dried eggs in production of slab, size cake and sponge goods is to reduce the ratio of water to dried eggs from 3:1 to 2:1.

Dried eggs can be used with advantage in all other types of flour confectionery at the rate of ½ lb. to 1 lb. per gallon of liquor used. As a "wash" for all confectionery goods a 10 per cent. solution of dried eggs will give a very satisfactory glaze.

* * *

Pigs for Home Consumption

Any person who intends to rear a pig for home consumption should obtain from his local food office a leaflet (F.904) setting out the revised conditions under which a self-supplier may obtain a licence to slaughter a pig.

Application for a licence must be made at least fourteen days before the date proposed for slaughter. Individual self-suppliers are required either to surrender fifty-two bacon coupons in respect of each pig killed under licence, or to sell half the carcass.

Information and Advice

Labelling Order

9,520. *Required, information regarding the Labelling Orler.* (London.)

The Labelling Order does not come into force until January 1, 1945, so that any advertisements running at the moment may continue to do so till the end of the year. After that time any claim for vitamins or certain minerals, whatever be the food for which they are made, must be disclosed. There are no exemptions from Article 5 of the Order (the article dealing with vitamin and mineral claims), though bread is exempt from the provisions of Article 2 (the article dealing with the labelling of prepacked food).

Custard and Blancmange Powder

9,381. *A judgment was given recently affecting the manufacture of custard and blancmange powder. The stipendiary stated that "proper custard was made from prepared starch and blancmange from cornflour, arrowroot and potato starch."*

We should be interested to know what "prepared starch" is and how it differs from cornflour. Also, is this the accepted composition and description for these two products in the trade in England? (Australia.)

We think that the definition you require for "prepared starch" is supposed to be given in the Food (Starch Food Powders) Order, 1944, No. 297, where it is stated:

"Starch means (i) starch made from maize, potatoes, rice, rye or wheat (including any wheat produce); (ii) flour or starch made from sago or tapioca (including cassova, manioc, mandioca and any similar tapioca plant); (iii) arrowroot."

The first group (i) are usually regarded as prepared starch and we think it is generally agreed that they should contain not less than 80 per cent. of starch.

In view of this Order, the definition given by the stipendiary would appear to be incorrect since the definitions given for blancmange powder and custard powder are identical except for the use of the words blancmange, custard and custard pudding.

Provided that any manufacturer complied with the conditions of his licence from the Ministry of Food, it is doubtful whether any magistrate would care to pass an adverse comment at the present time.

L. Eynon and J. H. Lane, in their book *Starch* (W. Heffer and Sons, Ltd., 1928), p. 217, say: "Cereal flours and starches are largely used in the manufacture of custard powders, etc.," and give recipes for custard powders based on a cornflour, rice flour and sago starch mixture.

J. A. Radley, in his book *Starch and its Derivatives* (Chapman and Hall, Ltd., 1943), p. 301, states: "Maize, tapioca and rice starches and flours have all been used in the manufacture of custard powders . . . blancmange powders, etc."

Cornflour is the flour obtained by milling the endosperm of the maize berry. It consists of practically pure maize starch and is called corn starch in the U.S.A. The approximate analysis of cornflour is: starch, 78 per cent.; moisture, 12 per cent.; protein, 7 per cent.; crude fibre, oil and ash, 3 per cent.

Maize starch in this country is the starch separated from the maize flour and has the approximate composition: starch 83·85 to 87·3 per cent.; moisture, 12 to 15 per cent.; protein, 0·1 to 0·2 per cent.; ash, 0·1 to 0·2 per cent.; fat, 0·5 to 0·75 per cent.

Information Supplied

9,371. *Information concerning the manufacture of citrus fruit juices.* (Scotland.)

9,379. *Names and addresses of firms making machines for preparing vermicelli.* (Eire.)

9,385. *Names and addresses of firms manufacturing machines for homogenising edible products.* (Northumberland.)

9,398. *Details of standards for mustard.* (Bucks.)

9,399. *Names and addresses of suppliers of plant to deal with meat industry.* (Yorks.)

9,416. *Details regarding Automatic "Taring" Scale.* (Beds.)

9,417. *Name and address of maker of hydrometer which reads direct in per cent. sulphur dioxide.* (London.)

9,418. *Names and addresses of firms supplying chicele.* (Yorks.)

9,419. *Address of firm supplying coffee percolators.* (London.)

9,420. *Suppliers of hospital trolleys.* (Yorks.)

9,421. *Information on how to prevent potatoes going black.* (Flint.)

9,422. *Names and addresses of firms specialising in the construction of machinery for margarine manufacture.* (Alexandria.)

9,423. *Suppliers of canning machinery.* (Alexandria.)

9,428. *Literature describing the test for sugar in citrus fruit squash and carbonated beverages.* (London.)

9,429. *Name and address of the manufacturers of lactic casein.* (London.)

Information Required

9,546. *Adhesive for fastening carborundum grit to metal for use in potato-cleaning machines which are also fed with water.* (Scotland.)

9,549. *References to the literature dealing with almond milling.* (London.)

9,561. *The names of makers of tape machines which connect fabric sections with tin-zinc alloy strip to form boxes; also makers of automatic gum wrapping machines which apply gummed tape.* (Yorks.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Improvements in and Relating to Baking Powders and like Raising-Compositions

This invention relates to improvements in leavening agents and more particularly to the production of baking powders.

We have found that improved leavening agents are obtained by mixing edible inorganic acid esters of the aliphatic hydroxy carboxylic acids, and/or edible salts, amides or esters thereof, with a baking carbonate and, if desired, other ingredients such as corn starch, rice, potato starch and the like. These leavening agents will, as compared with known leavening agents, produce biscuits, cakes and other types of raised baked goods of improved symmetry, bloom, crust colour, grain, texture and flavour. The sulphuric and phosphorus acid esters of hydroxyacetic acid, and of lactic acid, and their edible salts, amides and esters have been found particularly suitable for use according to the present invention.

According to the present invention, there is provided a process of leavening which comprises incorporating in the mass to be leavened a baking carbonate and an edible inorganic acid ester of an aliphatic hydroxy carboxylic acid and/or an edible salt, amide or ester of an inorganic acid ester of an aliphatic hydroxy carboxylic acid.

The present invention also includes a process of preparing improved leavening agents which comprises mixing an edible inorganic acid ester of an aliphatic hydroxy carboxylic acid or an edible salt, amide or ester thereof, with a baking carbonate.

Examples of inorganic acid esters of the hydroxy carboxylic acids which may be used according to the present invention include the sulphuric and phosphorous acid esters of hydroxyacetic acid, lactic acid, citric acid and tartaric acid. Some of the inorganic acid esters of the hydroxy carboxylic acids which may be used according to the present invention are liquids, in which case the baking carbonate and the "baking acid" would preferably be introduced separately at the time of mixing the batter or dough. Others of these inorganic acid esters are stable solids, in which case they may be used in the customary fashion.

The edible inorganic acid derivatives of the aliphatic hydroxy carboxylic acids may be used alone or in conjunction with such acidic constituents as hydroxyacetic, polyhydroxyacetic, citric, tartaric, and adipic acids and their acid sodium, ammonium and calcium salts and their neutral calcium salts, cream of tartar, calcium acid phosphate sodium acid pyrophosphate or sodium aluminium or bicarbonate.

550,539. E. I. Du Pont de Nemours and Co., and John Crawford Woodhouse.

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

561,532. MASON, R. D., and JUSTESEN, A. C.: Manufacture of a cream substitute.

561,534. NEWMAN, J. E., and KENNEDY, D. S.: Apparatus for drying grasses and the like.

561,604. ENOCK, A. GRAHAM-, LONGVILLE, H. W., and GRAHAM-ENOCK MANUFACTURING CO., LTD.: Pasteurisation of milk or other liquids.

561,629. RADIATION, LTD., AISHEN, A., and WINTER, D. A.: Means for the prevention of deposits in water heating, cooling, or other apparatus.

561,706. BEAVER, A. E. A., and CORN PRODUCTS CO., LTD.: Production of syrups from starch.

561,749. SANKEY AND SONS, LTD., J., and HELDEN W. VAN.: Metallic cooking and heating vessels having thermally conductive reinforced bases.

561,760. THOMPSON BROS. (BILSTON), LTD., HUTCHESON, A. M., BENNETT, SONS AND SHEARS, LTD., and HUTCHESON, W. W.: Milk coolers.

561,764. PELKMAN BROS., LTD., and PELKMAN, J. H. N.: Plant for making pies or other baked food products in large quantities.

561,781. HAMER, P., and IMPERIAL CHEMICAL INDUSTRIES, LTD.: Water treatment.

561,858. HARDING, E., and VIOROID, LTD.: Apparatus for irradiating foodstuffs by ultra-violet rays.

561,871. HIGHFIELD, J. S., and FAIRLEY, T. Crushing or pulverising machines.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

GLOBE.—628,491. Cornflour, and corn starch (for food). **Corn Products Co., Ltd.,** Avon House, 356/360, Oxford Street, London, W. 1.

SILVER PLATE.—628,561. Canned fruits, canned vegetables, and canned fish. **W. M. Turner and Co., Ltd.,** 26, Produce Exchange Buildings, Victoria Street, Liverpool, 2.

BROADCAST.—627,548. Chocolates, sweetmeats and confectionery (none being medicated). **Barker and Dobson, Limited,** Franklin Place, Whitefield Road, Everton, Liverpool 6, manufacturers.

HILL TOP.—628,145. All goods included in Class 30, except sweetmeats. **Nurdin and Peacock, Limited**, 59, 61, 63 and 65, Wells Street, London, W. 1, Wholesale Provision Merchants. To be associated with No. 628,144 (3462), xxix.

MYRIASPICE.—628,223. Spices for food. **William Loudon Douglas** and **William Harry Battarbee**, trading in co-partnership, 12, Imber Park Road, Esher, Surrey, Manufacturers and Merchants.

New Companies

Rona African General Produce Company, Limited. (387464.) 57-58, Reckleford, Yeovil, Som. To carry on bus. of importers, exporters and brokers of cocoa and general produce, etc. Nom. cap.: £10,000 in £1 shares. Dirs.: E. B. Quaynor, 8, Gloucester Street, Stroud; S. Roberts, Barrington Court Farm, near Ilminster, Som.; E. A. Seager, Enterprise Garage, Sherborne, Dorset.

Chiseldon Grain Dryers, Limited. (387508.) Burderop Farm, Wroughton, near Swindon, Wilts. Nom. cap.: £5,000 in £1 shares. Dirs.: C. W. Whatley, Burderop Farm, Wroughton, near Swindon, Wilts; N. L. Whatley, Badbury Manor, near Chiseldon, Wilts.

Glacé Fruits, Limited. (387592.) 92, Beaumont Road, E. 10. Nom. cap.: £100 in £1 shares. Dirs.: H. S. Rowlandson, Claremont, Crescent Road, Enfield; G. S. Macdonald, 137, Wellington Road, Enfield.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.